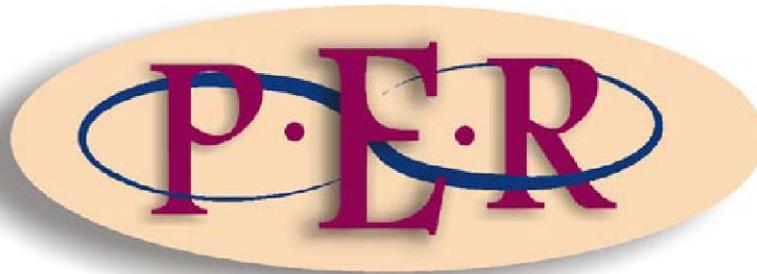


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SHAKEN BABY SYNDROME: A SOUTH AFRICAN MEDICO-LEGAL PERSPECTIVE

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1. Introduction

Shaken Baby Syndrome (SBS) refers to the violent and repetitive shaking of an infant/toddler (usually under the age of two years), as well as the causative role of the relative impact upon the release of shaking that causes intracranial injuries and haemorrhages, including retinal haemorrhages, and that can lead to severe disabilities or even the death of the child.¹ SBS is also known as Whiplash Shaken Infant Syndrome and is a form of abusive head trauma² that designates one of the mechanisms leading to skull and brain injuries in infants and children, usually under the age of two years.³ The inconsolable crying of a child and the high levels of frustration that such persistent behaviours that contradict parent or caregiver expectations can provoke are usually cited as the main triggers of the abusive behaviour. Young children are extremely susceptible to sustaining injuries from shaking due to their particular physical vulnerabilities, like heavy heads, weak neck muscles, thin skull walls and soft and rapidly growing brains.⁴ The morbidity and mortality rates from shaking are furthermore high; it is suggested that only 15%

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¹ Shaken Baby Syndrome therefore refers to the mechanism of injury in such cases of child abuse. Mehl 1990 *Child Abuse and Neglect* 603; Albert, Blanchard and Knox 2012 *JAMA* 39-40.

² Also referred to as inflicted childhood neuro-trauma, non-accidental head injury (NAHI) or inflicted traumatic brain injury/inflicted head trauma in children. The American Academy of Pediatrics (AAP) officially recommended in April 2009 that the term abusive head trauma be used to describe any assault-related injury among children (less than five years of age) that is inflicted to the head and its contents. This term (abusive head trauma) also avoids drawing any conclusions with regard to the mechanism that caused the injuries. For a comprehensive discussion and critique on the plethora of terms used to describe this condition, see Findley *et al* 2012 *Hous J Health L & Pol'y* 209-312.

³ Niederkrontenthaler *et al* 2013 *Child Abuse and Neglect* 447.

⁴ Couser 2013 *J Pediatr Health Care* 238.

survive with no lasting morbidity, and survivors are said to suffer from physical disabilities, neurological impairments and long-term behavioural problems, including self-injurious and self-stimulatory behaviours and hyperactivity.⁵

The main focus in this article is on the difficulty in diagnosing SBS, and on proving such allegations of child abuse in ensuing litigation. First the history and development of the syndrome is set out, and the most important clinical and pathological findings in diagnosing SBS are discussed. Then the most prominent cases in which parents and child-minders were charged with SBS in the USA, UK and South Africa will be considered. The discussion concludes with recommendations for medical and legal professionals confronted with a potential case of SBS.

2. The history of the shaken baby syndrome

In 1946 paediatric radiologist John Caffey published a landmark paper in which he described the cases of six children with multiple fractures and subdural haematomas. He suggested that trauma was the cause of the specific combination of injuries and advised physicians to look for fractures in children with subdural hematomas and *vice versa*.⁶ In 1956, less than ten years later, Virginia Jaspars was sentenced to 10 to 22 years' imprisonment for killing and injuring at least 15 infants that were left in her care, and after admitting that she had violently shaken baby Jennifer Malkan, causing her head to bob back and forth, after which "...the baby lost her breath and her eyes were funny in her head".⁷

In 1962 C Henry Kempe brought the Battered Child Syndrome and Abusive Head Trauma to public attention,⁸ contributing to the subsequent findings of British paediatric neurosurgeon, Norman Guthkelch, who in 1971 described shaking as a

⁵ Couser 2013 *J Pediatr Health Care* 238; Niederkrontenthaler *et al* 2013 *Child Abuse and Neglect* 447; Russell 2013 *Child Abuse and Neglect* 671; Laurent-Vannier *et al* 2009 *Ann Phys Rehabil Med* 436-447.

⁶ Also see Caffey 1946 *AJR* 163-173.

⁷ Jenny "Theory and Practice of Shaking Infants".

⁸ Kempe *et al* 1962 *JAMA* 17-24.

mechanism for intracranial injuries in infants and young children.⁹ In 1974 John Caffey formally suggested the name "Whiplash Shaken Infant Syndrome" for the "vigorous manual shaking of infants by the extremities or shoulders, with whiplash-induced intracranial and intraocular bleeding, but with no external signs of head trauma."¹⁰ This particular form of child abuse is said to result in a constellation of injuries including: subdural haematoma, diffuse axonal injury, hypoxic cerebral injury and retinal haemorrhages.¹¹ Probably the most significant feature of SBS is that it is a clinical condition without any pathognomonic signs and injuries, which makes it difficult to establish the extent, severity and outcomes of the condition.¹²

Since the syndrome was first observed and described by Guthkelch and Caffey, much research has been published.¹³ By 1985 it was being said that head trauma was not only the most frequent cause of permanent damage or death among abused infants and children, but that SBS accounted for a significant number of those cases.¹⁴ In 2009, in the USA, Abusive Head Trauma (AHT) was the leading cause of death from trauma and a major cause of disability in children younger than two years.¹⁵ Kelly *et al* submitted that in terms of published epidemiological studies, the incidence of SBS is "remarkably consistent across the world" and that 20 to 30 per 100 000 infants under the age of 1 year are subjected to this form of child abuse every year.¹⁶ These statistics are furthermore believed to underestimate the true incidence of SBS as they usually only relate to the most severe cases, where the

⁹ Guthkelch 1971 *BMJ* 430-431; Findley *et al* 2012 *Hous J Health L & Pol'y* 223. Also see the most recent publication by Guthkelch on Shaken Baby Syndrome, Guthkelch 2012 *Hous J Health L & Pol'y* 201-208.

¹⁰ Dykes 1986 *Child Abuse and Neglect* 211; Caffey 1972 *Am J Dis Child* 161-169; Caffey 1974 *Pediatrics* 396-403; Findley *et al* 2012 *Hous J Health L & Pol'y* 223.

¹¹ Gould 2001 *Curr Diagn Path* 69-75; Editorial 1998 *The Lancet* 335.

¹² Barr and Runyan 2008 *Am J Prev Med* S107.

¹³ Fortin and Stipanovic 2010 *Ann Phys Rehabil Med* 693-710; Hadley *et al* 2000 *Neurosurgery* 536-540; Saternus, Kernbach-Wighton and Oehmichen 2000 *Forensic Sci Int* 203-213; Starling *et al* 2004 *Arch Pediatr Adolesc Med* 454-458; Biron and Shelton 2005 *Child Abuse and Neglect* 1347-1358.

¹⁴ Couser 2013 *J Pediatr Health Care* 238; Berger, Kochanek and Pierce 2004 *Child Abuse and Neglect* 739.

¹⁵ Niederkrontenthaler *et al* 2013 *Child Abuse and Neglect* 447; Bechtel and Berger 2006 *Pediatric Emergency Medicine* 138-142.

¹⁶ Kelly, MacCormick and Strange 2009 *Child Abuse and Neglect* 394; Keenan *et al* 2003 *JAMA* 621-626; Albert, Blanchard and Knox 2012 *JAMA* 39-40.

child was taken to an emergency care unit or medical practitioner. The lack of an autopsy in all suspicious infant deaths rules out the possibility of a certain diagnosis in all cases, and it is often too difficult to differentiate between abusive and accidental head injuries.¹⁷

Yet, as early as 1987 the relationship between shaking and intracranial injury came under intense scrutiny and criticism.¹⁸ Many asked if the shaking of a child could generate sufficient force for serious or fatal injury.¹⁹ Moreover, the lack of any external signs of abuse makes it difficult to diagnose SBS in an emergency room setting or in the general practitioner's office. But while the impact might not be clinically visible it can be revealed through advanced medical imaging and at the autopsy in the event that the child succumbs to his/her injuries. In the following section the pathology and diagnosis of SBS will be discussed. The discussion will specifically focus on the two-part hypothesis that "in the absence of a confirmed alternative explanation, one can reliably diagnose shaking or abuse from three internal findings, [also referred to as the triad of injuries], - subdural haemorrhage, retinal haemorrhage and encephalopathy (brain abnormalities and/or neurological symptoms)".²⁰

3. Diagnosing Shaken Baby Syndrome

Often, in cases where SBS is alleged, the history of shaking is not forthcoming. In fact, there may be a complete absence of any trauma history, or otherwise very slight trauma that is not usually associated with the symptoms experienced. In some cases where the caregivers admitted to shaking the child, the level of violence reported ranged from the violent history as described in the Jaspars case mentioned above, to merely shaking the infant in an attempt to wake an unresponsive child.

¹⁷ Laurent-Vannier *et al* 2011 *Ann Phys Rehabil Med* 534; Togioka 2008 *J Emerg Med* 98.

¹⁸ Duhaime *et al* 1987 *Journal of Neurosurgery* 409-415; Goldsmith and Plunkett 2004 *Am J Forensic Med Pathol* 89-100; Donohoe 2003 *Am J Forensic Med Pathol* 239-242.

¹⁹ Case 2007 *Legal Medicine* 83-87.

²⁰ Findley *et al* 2012 *Hous J Health L & Pol'y* 212.

In the medical literature, most texts referring to a diagnostic triad for a diagnosis of SBS require the presence of the following triad of injuries - subdural haemorrhage, retinal haemorrhage and encephalopathy. However, some scholars replace encephalopathy with long bone fractures, and others with the absence of external signs of injury (the Ontario triad).²¹ Briefly, the main components of the traditional triad are:

- *Subdural haemorrhage (SDH)*: The brain is covered by a thick, fibrous layer, called the *dura mater*. An SDH is the collection of blood that occurs underneath the *dura mater*. This type of haemorrhage is most commonly associated with the tearing of the bridging veins that connect the brain to the *dura mater*. These veins tear easily in acceleration/deceleration type injury or falls from a height. Similarly, the shaking of the head in SBS is alleged to cause SDH. However, in cases of SBS, the SDH is typically only a thin film of blood over the hemispheres, not a large space-occupying lesion as is found in trauma cases.²² This haemorrhage is typically diagnosed with a CT scan or at autopsy.
- *Retinal haemorrhage (RH)*: The retina is the light-sensitive layer of neural cells that is found at the back of the eyeball. In the clinical setting haemorrhage may be seen in this tissue with fundoscopy, while it can be diagnosed at autopsy after the removal of the eye. Two main theories are put forth to explain the occurrence of RHs in SBS. The first postulates that increased intracranial pressure due to cerebral oedema and subdural haemorrhage leads to an increase in venous pressure in the retina. The second theory suggests that acceleration and deceleration in shaking leads to traction of the vitreous on the retina and subsequent tears.²³
- *Encephalopathy*: Encephalopathy refers to the neurological symptoms, like irritability, seizures, lethargy and loss of consciousness, presenting in surviving infants. At autopsy, the most commonly suggested pathological correlate for

²¹ Case 2007 *Legal Medicine* 83-87.

²² Geddes and Whitwell 2004 *Forensic Sci Int* 85.

²³ Kivlin *et al* 2000 *Ophthalmology* 1246.

encephalopathy is Diffuse Axonal Injury (DAI). This is a microscopic diagnosis that is made when so-called spheroids are seen in the white matter of brain sections. However, the infant needs to survive more than 12 hours after the incident before any spheroids will be seen on microscopy. The development of DAI is also linked to acceleration/deceleration injury, but of a longer duration than is found in falls.²⁴ Significantly, DAI is associated with a loss of consciousness that follows immediately on the injury. In the traditional model of SBS this fact was used to point out the alleged perpetrator of the shaking as the person in whose care the infant was at the time of the onset of the symptoms.²⁵ Other findings like hypoxic-ischaemic injury, diffuse swelling and intra-parenchymal tears may also be present in the brain.²⁶

The traditional view is that these injuries in the triad can be caused only by severe trauma, like a motor vehicle accident or a fall from a multi-story building, or shaking. However, this opinion is currently being challenged by evidence to the contrary. Although rib fractures and long bone fractures are commonly found in cases of non-accidental injury in children, these findings are not typically included in the discussion of SBS.

3.1 Concerns about the triad

The triad, as described above, has for some years been the focus of intense scrutiny, with many voices suggesting that shaking alone cannot be sufficient to cause the injuries found in these cases. One of the first authors to raise concerns around the causation of the syndrome was Ann-Christine Duhaime. Duhaime and her colleagues reviewed 48 cases of infants and young children in which the diagnosis of SBS was made. This included 13 fatalities, all of which had signs of blunt impact to the head, often only diagnosed at autopsy. With elaborate instrumentation it was proved that angular accelerations for impacts were up to 50 times bigger than for shaking. In fact, the accelerations for shakes were below the injury thresholds

²⁴ Graham and Gennarelli "Trauma" 234-262.

²⁵ Tuerkheimer 2010-2011 *Ala L Rev* 516.

²⁶ Squier 2011 *Acta Neuropathologica* 519-542.

established for subhuman primates, while impacts could potentially cause all of the injuries associated with SBS.²⁷ A 2002 biomechanical review determined that even a three foot fall produces forces up to ten times greater than shaking. According to this study, SDH and neck injuries may be expected after shaking, especially prolonged or repetitive shaking, but no brain injuries.²⁸ Findings like these led some researchers to suggest that the term "Shaken Impact Syndrome" gives a better representation of events – that some measure of impact also has to occur to cause these injuries.

In 2001 Geddes and Whitwell published a study of the brains of 53 infants who had allegedly died from abuse. They found that hypoxic brain damage was pervasive in these cases, and very little evidence of diffuse axonal injury was present – the condition usually offered to explain the encephalopathy in cases of SBS. Geddes *et al* also found that about one third of cases had cranio-cervical injury, especially in the brainstem.²⁹ These findings, together with those published in 2004, led to the proposal of the following hypothesis regarding the triad: Injury (whether traumatic or metabolic) leads to apnoea, which causes severe hypoxia and resultant brain swelling. The subdural and retinal haemorrhages are, according to this hypothesis, also consequences of hypoxia.³⁰ The implication is that the triad may be caused by many other conditions, even natural diseases. In fact, the differential diagnosis for the triad includes conditions like birth trauma, nutritional deficits, metabolic disorders, infections, coagulopathy,³¹ and re-bleeds of chronic SDHs after previous minor injury.³² It is now also accepted that a lucid interval may occur after the

²⁷ Duhaime *et al* 1987 *Journal of Neurosurgery* 409-414.

²⁸ Ommaya, Goldsmith and Thibault 2002 *Brit J Neurosurg* 226.

²⁹ Geddes *et al* 2001 *Brain* 1290-1298. Only 3 out of 53 cases had widespread traumatic axonal injury, and two of these had multiple skull fractures.

³⁰ Geddes and Whitwell 2004 *Forensic Sci Int* 83-88. In cases of alleged SBS the subdural haemorrhage typically consists of a thin film of blood, not a large space-occupying lesion as is found in traumatic SDH. In 50 paediatric cases without head injuries the researchers found evidence of hypoxic brain injury together with *intra*-dural haemorrhage and resultant thin film SDH.

³¹ Squier 2011 *Acta Neuropathologica* 521.

³² Findley *et al* 2012 *Hous J Health L & Pol'y* 239.

injury, which contradicts the assertion that a perpetrator may be identified by the timing of the collapse of the infant.³³

In a literature review published in 2003 Donohoe found that there are major data gaps in the medical literature regarding SBS, and that the data were inadequate to support any standard case definitions or diagnostic assessments.³⁴ Most studies and case reports suffered from the same circularity of reasoning: if SDH and RH were often found in cases of alleged SBS, the presence of these lesions purportedly "proved" that the baby had been shaken intentionally. Donohoe concluded that "(w)ithout published and replicated studies ... the commonly held opinion that the findings of SDH and RH in an infant was strong evidence of SBS was unsustainable, at least from the medical literature".³⁵

In 2009 the American Academy of Paediatricians released a policy statement in which it advised that the term "Shaken Baby Syndrome" should be replaced with "Abusive Head Trauma" to keep abreast of the current understanding of pathological mechanisms.³⁶ In 2011 the UK Crown Prosecution Service followed suit.³⁷ As early as in 2006 the National Association of Medical Examiners (NAME) in the USA withdrew its "Position Paper on Fatal Abusive Head Injuries in Infants and Young Children", which had incorporated the traditional SBS hypothesis. This document has not been replaced with any subsequent paper.³⁸ In 2012 Guthkelch, one of the original proponents of the term "Shaken Baby Syndrome", suggested that the term "retino-dural haemorrhages of infancy" be used for this constellation of injuries, as "[t]his would allow us to investigate causation without appearing to assume that we already know the answer".³⁹

A number of conditions and events can therefore cause the lesions found in the triad of injuries traditionally associated with SBS. Members of the scientific community are

³³ Tuerkheimer 2010-2011 *Ala L Rev* 517.

³⁴ Donohoe 2003 *Am J Forensic Med Pathol* 241.

³⁵ Donohoe 2003 *Am J Forensic Med Pathol* 241.

³⁶ Findley *et al* 2012 *Hous J Health L & Pol'y* 241.

³⁷ Squier 2011 *Acta Neuropathologica* 521.

³⁸ Findley *et al* 2012 *Hous J Health L & Pol'y* 241.

³⁹ Guthkelch 2012 *Hous J Health L & Pol'y* 202.

unable to give a unifying explanation for the presence of these lesions and are therefore also unable to state with absolute certainty that the presence of the triad of injuries is conclusive evidence of SBS.⁴⁰

4. Litigating Shaken Baby Syndrome

A real risk therefore exists of misdiagnosing some children with subdural haematomas due to other causes as having SBS. Important questions remain with regard to the amount of force, the duration and even the nature of the shaking necessary to create the injuries usually associated with SBS. In addition, the alleged correlation between the shaking of a child and the injuries that manifest is also questioned to such an extent that many argue that by focusing on shaking or inflicted trauma to the exclusion of accidental and natural causes we are running the risk of wrongfully blaming innocent parents and caregivers, and also of blinding ourselves to the possibility of an alternative explanation for the manifesting injuries.

If medical specialists are still undecided about the exact features that comprise this syndrome, then it is also inevitable that experts presenting such medical evidence in court will face similar difficulties. A typical defence strategy, for example, is to emphasise the overlap between AHT pathologies and other mechanisms of injury, instead of presenting the totality of all medical findings, together with the medical history of the child, and the available circumstantial evidence.⁴¹ The prosecution of SBS cases is furthermore complicated by the inability of the child to give an account of what had happened (because the child has passed away or is too young or has sustained severe brain injuries), and there is rarely a witness to or a confession by the particular caregiver or parent admitting to having fatally or seriously injured the child.⁴² The goal of the ensuing criminal proceedings is therefore to determine the exact circumstances that led to the injury of the child and to consider the contradictions between the medical diagnosis and evidence on the one hand and the narratives of the parent(s) and/or caregiver(s) on the other.

⁴⁰ Tuerkheimer 2010-2011 *Ala L Rev* 556.

⁴¹ Albert, Blanchard and Knox 2012 *JAMA* 39-40.

⁴² Ricci *et al* 2003 *Child Abuse and Neglect* 278; Findley *et al* 2012 *Hous J Health L & Pol'y* 257.

Some of the cases that have become notorious are those of Louise Woodward, the nanny of Matthew Eappen in the USA, who was convicted of manslaughter on 22 July 1998,⁴³ and Helen Stacey, a registered child-minder in the UK, who was sent to prison for life after being convicted of murdering Joseph Makin, a 5-month old who was left in her care.⁴⁴ Only a year later Louise Sullivan, an Australian carer, who had previously been dismissed for shaking the babies in her care in Australia, pleaded guilty to shaking six-month old Caroline Jongen until her brain rattled "like jelly in a mould".⁴⁵ Since there is, to date, no reported case law available on SBS in South Africa, the discussion in this section will turn to case law from other jurisdictions, particularly from the USA and the UK, in mapping the main problems associated with litigating SBS.

4.1 United States of America

In *Cavazos v Smith*⁴⁶ the US Supreme Court had to decide the fate of Shirley Ree Smith, the grandmother of 7-week-old Etzel Glass, who died on 29 November 1996. While doctors initially thought that Etzel had died from Sudden Infant Death Syndrome (SIDS) - the diagnosis often made in cases of unexplained death in an infant who shows no outward signs of trauma and no other cause of death - the coroner concluded that the cause of death was SBS. In response to this, Etzel's grandmother (hereafter Smith) admitted that Etzel had not responded to her touch and that she had picked him up and given him "a little shake, a jostle" in order to wake him up. With Smith facing charges of assault resulting in a child's death in terms of the California Penal Code, the ensuing litigation became a battle between the experts.⁴⁷

The three experts called by the prosecution focussed their testimony on the brain haemorrhages revealed in the autopsy report, as well as a bruise and abrasion found on the lower back of the baby's head. This, they argued, was consistent with violent

⁴³ *Commonwealth v Woodward* 694 NE 2d 1277 (1998) 1281.

⁴⁴ Editorial 1998 *The Lancet* 335.

⁴⁵ Hall 1999 <http://www.theguardian.com/uk/1999/jan/19/sarahhall>.

⁴⁶ *Cavazos v Smith* 132 S Ct 2 (31 October 2011) (per curiam).

⁴⁷ *Cavazos v Smith* 132 S Ct 2 (31 October 2011) 2.

shaking.⁴⁸ Carpenter, an expert for the prosecution, furthermore identified two means by which shaking can result in a baby's death: the shaking can either cause blood vessels in the brain to tear, creating a pool of blood that pushes the brain downward into the spinal canal, or the shaking itself can be so severe that the brain directly tears in vital areas, causing death with very little bleeding.⁴⁹ In this case Etzel's injuries were consistent with the latter pathology.⁵⁰

The two experts testifying for the defence, on the other hand, conceded that Etzel had died from brain trauma but submitted that it could not have been caused by SBS since the autopsy did not reveal retinal haemorrhage. There was furthermore minimal subdural/subarachnoid haemorrhage, no brain swelling and no fractures, sprains or other indications of trauma other than the abrasion and bruise to which the prosecution's experts alluded in their testimony.⁵¹ Moreover, since retinal haemorrhage is present in 75-80% of SBS cases, the absence thereof in this particular case raised considerable doubt as to whether or not the injuries could indeed have been caused by SBS.⁵² Yet the defence experts did not agree on the most likely cause of Etzel's death. Siegler was of the opinion that Etzel had died from previous trauma, whilst Goldie testified that Etzel's death was indeed due to SIDS and that the bleeding in the brain could be attributed to the resuscitation efforts.⁵³

The jury ultimately found Smith guilty as charged, a verdict that was confirmed by the California Court of Appeal.⁵⁴ But the Ninth Circuit court reversed the decision, stating that "[d]espite the plentitude of expert testimony in the trial record concluding that sudden shearing or tearing of the brainstem was the cause of Etzel's death," the evidence was not sufficient to permit an expert conclusion one way or the other, since there was "no physical evidence of ... tearing or shearing, and no other evidence supporting death by violent shaking".⁵⁵ However, this decision was

⁴⁸ *Cavazos v Smith* 132 S Ct 2 (31 October 2011) 3.

⁴⁹ *Cavazos v Smith* 132 S Ct 2 (31 October 2011) 3.

⁵⁰ *Cavazos v Smith* 132 S Ct 2 (31 October 2011) 3.

⁵¹ Findley *et al* 2012 *Hous J Health L & Pol'y* 221.

⁵² *Cavazos v Smith* 132 S Ct 2 (31 October 2011) 4.

⁵³ *Cavazos v Smith* 132 S Ct 2 (31 October 2011) 4.

⁵⁴ *Cavazos v Smith* 132 S Ct 2 (31 October 2011) 5.

⁵⁵ *Cavazos v Smith* 132 S Ct 2 (31 October 2011) 6; *Smith v Mitchell* 437 F 3d 884 (2006) 890.

rejected in a 6-3 majority by the US Supreme Court of Appeal, which accepted that doubts exist about whether Smith was indeed guilty, but held that there was evidence in the brain itself – such as subdural and subarachnoid haemorrhage, haemorrhage around the optic nerves and the presence of a blood clot between the brain's hemispheres – that was consistent with a finding for SBS.⁵⁶

In a dissenting judgement, Justices Ginsburg, Breyer and Sotomayor questioned the reliance placed on the prosecution's expert medical witnesses, stating that the medical evidence was not typical of shaken baby cases and that it was based largely on Dr Carpenter's submission that when there is subdural haemorrhage without signs of external trauma to the head or skull, the injury is necessarily caused by violent shaking.⁵⁷ The three dissenting justices also considered the non-medical evidence and circumstances surrounding the unfortunate event, including the fact that grandmothers, especially those who are not the primary caregivers of the children, are usually not the typical perpetrators in shaken baby cases. There had been no evidence that Smith abused or neglected the other children (age 4 years and 14 months) who were also in the room when Etzel had died, and there was no evidence of any precipitating event that might have caused Smith to snap.⁵⁸ Reference was furthermore made to a comprehensive list of medical literature showing the increased doubt in the medical community over whether infants can be fatally injured through shaking alone, and the conflicting views of medical experts on most aspects of causation, diagnosis, treatment and other matters pertaining to SBS.⁵⁹

Smith was eventually granted clemency on 6 April 2012, having spent almost 10 years of her indeterminate sentence of 15 years to life imprisonment.

⁵⁶ *Cavazos v Smith* 132 S Ct 2 (31 October 2011) 7.

⁵⁷ *Cavazos v Smith* 132 S Ct 2 (31 October 2011) 1-2.

⁵⁸ *Cavazos v Smith* 132 S Ct 2 (31 October 2011) 1-2; *Smith v Mitchell* Case No CV 01-4484-ABC (CD Cal, Mar 22, 2004) 10, App I to Pet For Cert 65.

⁵⁹ *Cavazos v Smith* 132 S Ct 2 (31 October 2011) 5-6.

4.2 *United Kingdom*

In June 2005 the Court of Appeal in London heard four appeals brought by four different parents who had been convicted of culpable homicide/manslaughter and one instance of grievous bodily harm against their respective children.⁶⁰ These convictions were based on the triad of injuries traditionally associated with SBS, and were challenged on the basis that "medical research had developed to the extent that there is now 'fresh evidence' which throws doubt on the safety of each conviction".⁶¹ This "new medical research" was the work of Dr Jennian Geddes, a neuropathologist, and her team, who produced three papers setting out the findings of their research on the triad conducted between 2000 and 2004.

The three papers were later dubbed Geddes I, II and III, and the research findings became known as the new or unified hypothesis.⁶² The unified hypothesis did not show that the triad of injuries was inconsistent with a diagnosis of SBS, but it challenged the supposed infallibility of the triad and relied on the proposal that there was indeed one unified cause of the triad of injuries but it was not necessarily trauma.⁶³ Although this new hypothesis generated fierce debate in medical circles, Dr Geddes accepted during cross-examination in this case that "the unified hypothesis was never advanced with a view to being proved in court", and that it might not be quite correct. She also said: "I think we might not have the theory quite right. I think possibly the emphasis on hypoxia – no, I think possibly we are looking more at raised pressure being the critical event."⁶⁴ And, "I would be very unhappy to think that cases were being thrown out on the basis that my theory was fact. We asked the editor if we could have 'Hypothesis paper' put at the top and he did not, but we do use the word 'hypothesis' throughout".⁶⁵

⁶⁰ *R v Harris* [2005] EWCA Crim 1980 (21 July 2005); also see *Case of Allen v The United Kingdom* 25424/09, 12 July 2013 ECHR.

⁶¹ *R v Harris* [2005] EWCA Crim 1980 (21 July 2005) para [3].

⁶² *R v Harris* [2005] EWCA Crim 1980 (21 July 2005) para [57].

⁶³ *R v Harris* [2005] EWCA Crim 1980 (21 July 2005) para [57].

⁶⁴ *R v Harris* [2005] EWCA Crim 1980 (21 July 2005) para [58].

⁶⁵ *R v Harris* [2005] EWCA Crim 1980 (21 July 2005) para [58].

With the Geddes unified hypothesis dismissed, the court turned its attention to the minimal force required to produce the triad of injuries associated with SBS.⁶⁶ It concluded that the minimal force necessary to injure an infant in this manner was unknown and would probably never be known with certainty as "all methods of estimating force, including biomechanical studies, animal research, and clinical comparison with other forms of injury were, to some extent, incomplete and not fully applicable to human infants".⁶⁷ Most of the experts accepted, however, that if everyday accidents caused this particular pathology, such cases would be extremely common. The occurrence of minor accidents of sufficient force to cause these particular injuries in an infant, that might occur in the normal handling or rough handling of an infant, were said to be rare or even extremely rare.⁶⁸

It is against this backdrop that the court reviewed the four appeals, of which two were eventually dismissed and two were upheld.⁶⁹ The court emphasised that cases of alleged SBS are fact-specific and that no general rule or hypothesis can be used in making a determination.⁷⁰ Concern was also raised about the significant failure of criminal justice systems in exercising control and proper oversight over expert evidence with regard to SBS. The following obligations of expert witnesses were reinforced:

- Expert evidence should be the "independent product of the expert", uninfluenced by the parties and the demands of the litigation.
- Expert witnesses should provide independent assistance to the court by way of objective and unbiased opinions in relation to matters within their expertise.

⁶⁶ Richards *et al* 2006 *Arch Dis Child* 205-206; also see Bandak 2005 *Forensic Sci Int* 71-79.

⁶⁷ *R v Harris* [2005] EWCA Crim 1980 (21 July 2005) para [78]-[79], [96]; Richards *et al* 2006 *Arch Dis Child* 205-206.

⁶⁸ *R v Harris* [2005] EWCA Crim 1980 (21 July 2005) para [78]-[79], [96]; Richards *et al* 2006 *Arch Dis Child* 205-206.

⁶⁹ *R v Harris* [2005] EWCA Crim 1980 (21 July 2005) para [103].

⁷⁰ *R v Harris* [2005] EWCA Crim 1980 (21 July 2005) para [267].

- Expert witnesses should state both the facts and assumptions on which their opinion is based, as well as material facts that may detract from their concluded opinions.
- Expert witnesses should not testify or offer an opinion about matters that fall outside their areas of expertise.
- When the research and/or data on a particular topic is insufficient or inconclusive, this must be declared, and if the expert opinion is provisional, experimental or contested, this too must be declared.
- Expert witnesses should be allowed to change their view on matters if material evidence and/or opinions from other witnesses sway their mind. This should be communicated to the court and all parties concerned without delay.⁷¹

4.3 South Africa

Although these decisions in the United Kingdom and the USA do not dispel the use in such cases of the triad of encephalopathy, subdural haemorrhages, and retinal haemorrhages, widespread agreement now exists that the presence of the triad alone – or its individual components – is not enough to diagnose abuse. This was endorsed by the UK Crown Prosecution Service Guidelines of March 2011.⁷² These developments are important in the South African context, since there is currently no authoritative South African judgement available on SBS.

Contrary to most cases of child abuse - like the recent case of *S v Rudman* 2013 JDR 0712 (GNP) where allegations of child abuse are supported by evidence of a history of hospital and doctor visits for unexplained and suspicious injuries, a myriad of physical injuries in different stages of healing, as well as witness accounts

⁷¹ *R v Harris* [2005] EWCA Crim 1980 (21 July 2005) para [271] based on Cresswell J in *Ikerian Reefer* [1993] 2 Lloyd's Rep 68 81; compare with the South African case of *Michael v Linksfield Park Clinic (Pty) Ltd* (1) (361/98) [2001] ZASCA 12 in which the Supreme Court of Appeal set out the South African approach to expert evidence in paras [34]-[40]. It must be noted, however, that this case dealt with the approach to expert evidence in cases of medical negligence in South Africa and not in the context of criminal proceedings, as is discussed here.

⁷² Findley *et al* 2012 *Hous J Health L & Pol'y* 213; Richards *et al* 2006 *Arch Dis Child* 205-206.

corroborating the allegations of child abuse - a typical case of SBS is usually absent of all these auxiliary factors. This does not mean, however, that South African courts will not be able to infer that child abuse had occurred and was in fact the cause of the injuries and/or fatality of the infant.

In the unreported case of *SA Willers & AM Willers* (No. 14/5829/95), for example, a couple was convicted of the abuse of four of their five children even though there were no witnesses to the alleged abuse and the children themselves were unable to attest thereto. Each of the children in this case displayed a variety of recent and older healing injuries, including bone fractures, rib fractures and bruises. With regard to the first and fourth child it was alleged that their injuries, which included a fatal extradural haematoma and a developmental delay respectively, had been the results of being shaken.⁷³ The importance of this case is that no witnesses could confirm that the parents were indeed responsible for the children's injuries and/or were guilty of child abuse. Moreover, after 8 weeks of medical expert testimony no clarity as to how any of these injuries were sustained was reached. Yet the court emphasised that the particular long-term pattern of repeated injuries as well as the rarity of finding large bruises or fractures of long bones and ribs in very small infants who are non-mobile were indicative of non-accidental injuries in the children.⁷⁴

In *S v Campos* 2002 1 SACR 233 (SCA) an infant died as a result of multiple injuries, including subdural haemorrhage, a fracture-dislocation of the spine, bleeding of the hilum of the left lung, and multiple fractured ribs.⁷⁵ The appellant testified that when she discovered that her baby was not breathing she had *inter alia* vigorously shaken her child while holding her upside down.⁷⁶ Medical expert witnesses testified that the subdural haemorrhage that the baby had suffered could have been caused by the shaking of the child and that it may have been the sole cause of the baby's death.⁷⁷ However, the injuries suffered by the infant were of such a serious nature that any one of the injuries (subdural haemorrhage, fractured dislocation of the spine and

⁷³ Holford and de Villiers 1998 *SAMJ* 1326-1327.

⁷⁴ Holford and de Villiers 1998 *SAMJ* 1326-1327.

⁷⁵ *S v Campos* 2002 1 SACR 233 (SCA) para [10].

⁷⁶ *S v Campos* 2002 1 SACR 233 (SCA) para [27].

⁷⁷ *S v Campos* 2002 1 SACR 233 (SCA) para [29] and [37].

bleeding of the hilum of the left lung) could by itself, or in combination with one another, have been the cause of the baby's death.⁷⁸ Dr Klepp, a forensic pathologist, also testified that of the three major injuries suffered, the intracranial damage resulting in bilateral subdural haemorrhage was the most common cause of death in battered infants, and that it was usually produced by shaking a baby, but that any sudden rotational movement of the head could also produce the same result.⁷⁹ Death in these instances was usually the result of intracranial pressure caused by the intracranial bleeding, which forces the brain "into the aperture where the spinal cord enters the skull and so suppresses the heart and breathing functions".⁸⁰

It was ultimately held that the appellant should reasonably have foreseen that the shaking of her baby, together with the slamming or throwing of the infant with such colossal force as to cause the fracture-dislocation of the spine and bleeding of the hilum of the left lung could have resulted in death.⁸¹ The court furthermore accepted the medical testimony with regard to the shaking of the infant and the injuries caused, and no challenge was brought with regard to the nature of the shaking or bio-mechanics of how the injuries had been sustained. In this case the medical history of suspicious injuries as well as previous allegations of abuse against the parent is important, contributing to the court's acceptance of the parents' guilt in the death of their child.

5. Recommendations

5.1 *Collecting information*

Medical and legal professionals involved in cases of alleged child abuse should collect as much information as possible about the physical, environmental and medical historical context of the case. They should also be sensitive to the risk factors usually associated with SBS. For example, in most studies the victim of SBS is a male infant

⁷⁸ *S v Campos* 2002 1 SACR 233 (SCA) para [11] of the minority judgement by Conradie AJA.

⁷⁹ *S v Campos* 2002 1 SACR 233 (SCA) para [9] of the minority judgement by Conradie AJA.

⁸⁰ *S v Campos* 2002 1 SACR 233 (SCA) para [9] of the minority judgement by Conradie AJA.

⁸¹ *S v Campos* 2002 1 SACR 233 (SCA) para [38].

under the age of 6 months.⁸² In addition to the medical history of the child, parental risk factors such as parental age, educational level, marital status, welfare status, employment status, history of substance abuse, mental health problems, history of spousal abuse and/or domestic violence as well as a previous referral to child protective services are also relevant and should be taken into consideration together with the clinical findings.⁸³ When the parents or child minder is furthermore unable to provide a clear and consistent account of how the child sustained the injuries or what happened prior to the child falling ill, medical workers should be particularly suspicious and conduct a comprehensive evaluation.⁸⁴

Some of the concerns that medical practitioners may have include the fear that reporting such cases will worsen the situation in the family for the remaining children, fear of an overly severe response from the police or judicial system, and fear that their diagnosis may be wrong. It is therefore important that an open dialogue with the parents should be sustained in order for the medical practitioner to gain as much information as possible about the injuries the child had sustained, and to ensure that the parents are also informed of the potentially dangerous consequences of shaking their child.⁸⁵ It must furthermore be noted that medical practitioners who on reasonable grounds believe that a child was abused or maltreated and report such a *bona fide* belief are protected from civil liability in terms of sections 110(3) of *the Children's Act 38* of 2005.

Confessions by parents and/or caregivers should furthermore be treated with circumspection. It is evident from exoneration jurisprudence that false confessions have also contributed to many wrongful convictions in the USA.⁸⁶ For example, approximately 25% of the DNA exonerations won by Innocence Projects across the

⁸² It should be noted, however, that Shaken Baby Syndrome is usually diagnosed in children under the age of two and especially under the age of one. Fortin and Stipanovic 2010 *Ann Phys Rehabil Med* 699; Laurent-Vannier *et al* 2011 *Ann Phys Rehabil Med* 536.

⁸³ Lopes, Eisenstein and Williams 2013 *Journal de Pediatria* 426-433.

⁸⁴ Ricci *et al* 2003 *Child Abuse and Neglect* 278; Niederkrontenthaler *et al* 2013 *Child Abuse and Neglect* 452.

⁸⁵ Laurent-Vannier *et al* 2011 *Ann Phys Rehabil Med* 556.

⁸⁶ Weaver 2010 *Chi-Kent L Rev* 181.

states of America involved false confessions, guilty pleas or other incriminating statements.⁸⁷ The following are important in the context of SBS:

- There are remarkably few confessions relative to the large number of alleged shaking injury cases. Also, in some of the cases where confessions were offered, the confessions did not reliably match the recorded medical findings.⁸⁸
- The clinical definitions of "shaking" in medical literature and how it is understood by lay people who are experiencing severe stress and trauma in the face of SBS charges are furthermore ambiguous.⁸⁹ It is suggested that many parents and caregivers confess to mild shaking or other behaviours that hardly meet the criteria for a confession to the violent type of shaking required to sustain SBS injuries.⁹⁰
- Confessions in child abuse cases are also subject to coercive interrogation techniques that convince parents and/or caregivers that they have, in fact, committed a crime and that all the medical evidence point to their guilt.⁹¹ This is especially problematic since "distraught parents or caretakers may be particularly vulnerable to suggestion, manipulation or memory lapses".⁹²
- In South Africa, where plea-and-sentence-agreements are often used and even encouraged, confessions may become just a factor in a cost-benefit analysis, rather than a reflection of legal guilt.⁹³

5.2 Raising awareness

It is said that many parents are unaware of the dangers associated with shaking an infant, and that "shaking may be seen as an appropriate response to the feelings of

⁸⁷ Findley *et al* 2012 *Hous J Health L & Pol'y* 256.

⁸⁸ Findley *et al* 2012 *Hous J Health L & Pol'y* 258. In 63% of cases where confessions related to shaking only, clinical evidence of impact was also found. Squier 2011 *Acta Neuropathologica* 519-542.

⁸⁹ Findley *et al* 2012 *Hous J Health L & Pol'y* 258-259.

⁹⁰ Findley *et al* 2012 *Hous J Health L & Pol'y* 258-259.

⁹¹ Findley *et al* 2012 *Hous J Health L & Pol'y* 258-260.

⁹² Findley *et al* 2012 *Hous J Health L & Pol'y* 258-260

⁹³ Findley *et al* 2012 *Hous J Health L & Pol'y* 258-260

frustration and inadequacy that the seemingly unremitting crying of an infant can evoke." Gluthkelch states "that 'a good shaking' is felt ... to be socially more acceptable and physically less dangerous than a blow on the head or elsewhere".⁹⁴ In other words, physical abuse like slapping, hitting or throwing the infant is not only out of bounds culturally and socially, but also leaves external injuries that are noticeable to others. In contrast, the shaking of an infant is perceived to be without trauma as there are no external signs of abuse. In the USA between 2% and 4.4% of parents of children under 2 years old admitted to shaking their children to discipline them.⁹⁵

It is furthermore found that many caregivers and parents who have resorted to shaking children in their care had no intention of causing harm, but merely wanted to stop the baby from crying.⁹⁶ Awareness campaigns should therefore focus on support for and education in terms of caregiver or parent impulse control in addition to the dangers of shaking.⁹⁷ For example, campaigns aimed at raising awareness should ideally be coupled with programmes focussing on early detection and intervention in families where a real risk of child abuse exists and where the parents and/or caregivers are clearly not coping well with the general stressors of child rearing. Barr suggests that such programmes should target families of newborns, where there is a temporal proximity to the birth, where inciting stimuli (like crying) are present, and where specific parent and/or caregiver risk behaviour is present.⁹⁸ Such awareness campaigns should furthermore offer parents and caregivers information and training on infant soothing techniques and appropriate responses for parents and caregivers in the high-stress context of an infant's inconsolable cries.⁹⁹

⁹⁴ Dykes 1986 *Child Abuse and Neglect* 212; Fortin and Stipanovic 2010 *Ann Phys Rehabil Med* 699.

⁹⁵ Runyan 2008 *Am J Prev Med* S112-S115.

⁹⁶ Couser 2013 *J Pediatr Health Care* 238.

⁹⁷ Russell 2013 *Child Abuse and Neglect* 671.

⁹⁸ Barr and Runyan 2008 *Am J Prev Med* S108.

⁹⁹ Russell 2013 *Child Abuse and Neglect* 674.

6. Conclusion

Shaken Baby Syndrome is a particularly contested topic in medico-legal practice and – as was evident from the discussion above – requires great care and circumspection of medical and legal professionals. In this article emphasis has been placed on the difficulty of providing a conclusive diagnosis of SBS and the fact that it is now generally accepted that conditions other than shaking, even natural diseases, may be the cause of the so-called triad of injuries with which Shaken Baby Syndrome has traditionally been diagnosed.

Keith Findley, the current president of the global Innocence Network, and other scientists like Waney Squier from Oxford University and Patrick Barnes from Stanford University Medical Centre, suggest that the increased focus on evidence-based medicine – the movement supporting a critical appraisal of the medical evidence underlying a diagnosis and treatment - may be exactly "what the doctor ordered" to diffuse the uncertainty and debate around SBS.¹⁰⁰ They state:

While we support...[the] commitment to the prevention of child abuse, this commitment should not substitute subjective beliefs for objective scientific evidence. Instead, the commitment must be to getting it right.¹⁰¹ Based on what we now know, it is inappropriate for medical professionals to diagnose shaking or abusive head trauma based solely or primarily on the presence of subdural haemorrhage, retinal haemorrhage and/or encephalopathy. When a child abuse referral or diagnosis is made based on these findings, it should be clearly disclosed that there are many possible causes for these findings; that the issues are complex and poorly understood; and that shaken baby syndrome diagnosis based exclusively or primarily on three findings rests on good-faith beliefs and hypotheses, rather than science.¹⁰²

This article has also provided some practical guidelines and recommendations for medico-legal practice and awareness campaigns. A particularly important finding derived from the discussion on the case law is that a diagnosis of SBS requires a holistic approach and can be accepted only if corroborated by other evidence, including the medical history of the child. The risks involved in accepting (false)

¹⁰⁰ Findley *et al* 2012 *Hous J Health L & Pol'y* 299; also see Donohoe 2003 *Am J Forensic Med Pathol*.

¹⁰¹ Findley *et al* 2012 *Hous J Health L & Pol'y* 300.

¹⁰² Findley *et al* 2012 *Hous J Health L & Pol'y* 301; also see Donohoe 2003 *Am J Forensic Med Pathol* and Squier 2011 *Acta Neuropathologica*.

confessions and/or guilty pleas from parents or caregivers and placing too much weight on incriminating statements were also highlighted in terms of exoneration jurisprudence and research on the nature and incidence of confessions in the context of SBS. These precautions are necessary, as the prosecution of SBS is usually constructed by and based on medical expertise which, as has been shown here, is currently unable to provide a unanimous and conclusive scientific basis for the diagnosis of Shaken Baby Syndrome.

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LIST OF ABBREVIATIONS

AHT	Abusive head trauma
AJR	American Journal of Roentgenology
Ala L Rev	Alabama Law Review
Am J Dis Child	American Journal of Diseases of Children
Am J Forensic Med Pathol	American Journal of Forensic Medical Pathology
Am J Prev Med	American Journal of Preventive Medicine
Ann Phys Rehabil Med	Annals of Physical and Rehabilitation Medicine
Arch Dis Child	Archives of Disease in Childhood
Arch Pediatr Adolesc Med	Archives of Pediatrics and Adolescent Medicine
BMJ	British Medical Journal
Brit J Neurosurg	British Journal of Neurosurgery
Chi-Kent L Rev	Chicago-Kent Law Review
Curr Diagn Path	Current Diagnostic Pathology
Forensic Sci Int	Forensic Science International
Hous J Health L & Pol'y	Houston Journal of Health Law and Policy

J Emerg Med	Journal of Emergency Medicine
J Pediatr Health Care	Journal of Pediatric Health Care
JAMA	Journal of the American Medical Association
RH	Retinal haemorrhage
SAMJ	South African Medical Journal
SBS	Shaken Baby Syndrome
SDH	Subdural haemorrhage
SIDS	Sudden Infant Death Syndrome