



January 24, 2014

Client: Franklin Stevenson
Respondent: Smith, Joan

Victim(s): Smith, Tommy
Date of Incident: 3/14/11

Medical Records Reviewed on Tommy Smith:

- County Hospital (CH – Main Campus):
 - Birth Records 8/13/10-8/14/10
 - Well-Baby Visits 8/16/10-2/13/11
 - Inpatient Records 3/14/11-5/1/11 (not discharged)

Medical Records Reviewed on Joan Smith:

- CH perinatal records 1/30/10-8/14/10

Case Summary:

Tommy Smith was born without any complications on November 13th of 2010. He was a healthy, strong baby at 6 pounds 4.5 ounces. His discharge weight was 6 pounds 2.6 ounces, a normal weight loss for a newborn, but on his first clinic visit on 8/16/2011 he had lost more weight and his mother was instructed to supplement with formula or pumped milk by bottle. On day five he was back at birth weight and his mom reported that he was now bottle feeding breast milk only. No supplementation with Vitamin D was noted. The first documentation that Tommy was on formula was on January 1st, 2011.

On February 13th, 2011, Tommy was 7 months old and was sleeping through the night, rolling over, sitting up with assist, and starting on solid foods. The well-baby visit documented no signs of infection or any other problems. There was documentation that mom noted his eyes sometimes crossed, known as esotropia. This is a common finding up until 6 months and there is no known cause or treatment (Ocampo, 2010). It is unlikely to be related to the events that occurred on March 24th, 2011, but further research would be needed to determine any connection with seizure activity.

In the morning hours of March 24th, 2011, Joan woke at 3am and fed her son by giving him a bottle in the crib. She stated that she did not remove him from the crib and that she did not notice any problems at that time, and that it was not unusual for him to wake in the night to feed sometimes. At approximately 6 or 7am, he woke at his normal time and Joan gave him another bottle. He ate less than 4 ounces and was not overly interested in eating. At 8:30 or 9am he was fed his pureed peas for breakfast. At that time the dad noted he had eye deviation, a change in tone and began having difficulty breathing and vomited food out of both his nose and mouth. It was documented by Dr. Parker that the father states he may have tried to stimulate Tommy by shaking him at this time. The Emergency Physician documented that the parents stated he was in a swing at the time of the event but did not indicate that the child was eating at the time, so **it would be beneficial to obtain a clear story from the parents.**

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List of Injuries:

Subdural hematoma

Bleeding that collects between the two outermost layers of tissue that are between the skull and brain. This is generally caused by trauma and can be acute, subacute or chronic. Acute subdural hematomas result in bleeding immediately after the injury. **Subacute** subdurals bleed more slowly and develops over 48 hours to 2 weeks. A **chronic** subdural can result in a collection of blood over 2 weeks to months, and are most commonly seen in elderly patients (ENA, 2010). Although often caused by trauma, they can also be caused by infection, hypoxia (such as from respiratory arrest or choking), seizures and fluid-electrolyte imbalances. (Barnes, 2009). An evolving subdural bleed can also place pressure on other vessels, causing further damage and bleeding as it develops.

The subdural hematoma in Tommy's case was small, and not likely to have caused the respiratory arrest on June 24th, 2011. It was possibly a result of the more severe Diffuse Brain Injury.

Diffuse Brain Injury

Head injuries are classified into two groups, focal brain injury and diffuse brain injury (DBI). DBI is widespread damage to the brain cells with changes found on radiology images. DBI can be a result of a Hypoxic Ischemic Encephalopathy (HIE) or of a stroke (Barnes, 2009).

Hypoxic Ischemic Encephalopathy (HIE)

HIE is acute or subacute brain injury due to asphyxia, and the timing and cause are often unknown (Zanelli, 2011).

Tommy's DBI was what caused his respiratory arrest, either directly from the insult to the cells in the brainstem itself or because the damage was so extensive and the swelling so severe that it put pressure on his brainstem, causing his vital functions to decline.

Retinal hemorrhages (RH)

Retinal hemorrhaging is bleeding into the retina of the eye and is generally thought to be caused by an increase in retinal intravascular pressure (or increased pressure within the eye vessels) secondary to raised intracranial pressure and/or impaired venous blood return to the heart (Luthert, 2003). The presence of RH in the absence of significant trauma is generally considered to be non-accidental injury (aka child abuse or shaken baby syndrome) but most experts will accept that child abuse is only one of the potential causes of the hemorrhages. Despite the generally accepted foundations, there is much controversy surrounding Retinal Hemorrhages and child abuse. One study found that there was no direct data that supports the connection of RH in shaking (Luthert, 2003). There is literature that indicates the prevalence of RHs, as well as literature that supports causes other than child abuse and abusive head trauma. Other listed causes are CPR, infectious or post-infectious conditions (such as meningitis), increased intracranial pressure (such as would occur with a subdural hematoma), SIDS, and asphyxia/suffocation (Barnes, 2009) (Lantz & Stanton, 2006). It is also recognized that massive intracranial hemorrhaging can lead to RH that looks very similar to the RH found in non-accidental injuries (Luthert, 2003). **According to this literature, it is possible that the diffuse brain injury itself led to the retinal hemorrhages.**

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*In Tommy's case the ophthalmologist documented retinal folds on the 3/29/11 exam. Retinal folds have been documented to be linked to shaking injuries (Emerson, Jakobs, & Green, 2007) but even the cited article states that folds are thought to be caused by prolonged venous stasis and leakage from the retinal vessels, indicating that **any nature of RH can lead to folds**.*

Seizures

Seizures are an abnormal, excessive discharge of electrical activity in the brain. This can lead to generalized, uncontrollable body thrashing. "Population-based estimates suggest that every year 25,000-40,000 children in the United States experience a first unprovoked seizure" (Chu-Shore, 2011). Seizures in infants are complex and often difficult to recognize by the parents and can sometimes go unrecognized by healthcare staff as well. Vomiting, brief periods of apnea (absence of breathing) and eye deviation are common missed manifestations of seizures.

Summary of Opinions:

Many practitioners believe that intracranial hemorrhaging with retinal hemorrhages, present with the lack of obvious and severe physical trauma, is the result of non-accidental injury or "shaken baby syndrome". However, there are a number of mimics, including "hypoxia/ischemia (e.g. apnea, **choking**, respiratory or cardiac arrest), ischemic injury (e.g. arterial vs. venous occlusive disease), vascular anomalies (e.g. arteriovenous malformation -AVM), **seizures, infectious** or post-infectious conditions, coagulopathies, fluid/electrolyte derangement, and metabolic or connective tissue disorders including vitamin deficiencies and depletions (e.g. vitamins C,D,K)" (Barnes, 2009).

It is my opinion that Tommy's injuries are consistent with choking/seizure activity. My impression is that he choked on his bottle at 3 am and had a seizure as a result. The lack of oxygenation to the brain resulted in an ischemic event and is consistent with the findings on the MRI of 3/14/11. The lack of interest in feeding at 6 am is consistent with a slow bleed and slow progression of the swelling, edema and pressure on the brainstem. It demonstrated the beginning of a serious decline in vital functions. The subdural hematoma was small and possibly a result of the DBI. The main injury to the brain is a "perfusion injury."

It is also possible that Tommy had an infection, as evidenced by his elevated white blood cell (WBC) count and abnormal chest xray in the emergency department. I believe the infection is most likely a result of the aspiration of his milk at 3am and actually supports the theory of a choking episode as the signs of infection were minimal and appear to be in the beginning stages. The infection was not likely to have been severe enough to have been a cause of the brain injuries.

Thank you for the opportunity to work with you on this case. Please don't hesitate to contact me if you have any questions or concerns.

Tara Godoy, BSN RN CLNC
President, University Park LNC

For questions pertaining to this case, or for any other information, including referrals and initial reviews, contact Godoy Medical Forensics at 707-968-5060 or info@GodoyMedical.net

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Notes and Impressions

I don't think the eye-crossing (esotropia) is related, but if an ophthalmologist is eventually hired for this case it may be worth asking about any connection with seizure activity or retinal hemorrhages.

In the realm of biomechanics, I believe that an average adult would have difficulty shaking an 18 pound child to an extent to which it would cause severe brain damage as in this case. In this sense, looking at the potential perpetrators (i.e. the babysitter) would require an assessment of their physical strength and prowess. It may be beneficial to have a biomechanical engineer assess the strength of the defendant/respondent and testify as to their ability (or lack thereof) to shake 18 pounds with the strength to cause cerebral injury.

Depending on the results of the expert analysis, it may be beneficial to have a dummy made using the child's height and weight to show to the jury that our client would not have the strength to be able to cause the injuries.

One note of interest is that the first exam that was done by the Ophthalmologist on 3/14/11 at 1342 was not a dilated exam. The dilated exam was not performed until 3/29/11 1545. It is unclear to me whether the *dilated* exam is critical to perform within the first 24 hours but expert opinion is that the retinal hemorrhages need to be evaluated within the first 24 hours to assess them in the acute phase. There is literature that shows that RH's can change after that timeframe, and the theory that the retinal folds are thought to be from a prolonged state of venous stasis and leakage indicates that the second exam most likely had findings that would not have been present on the first exam.

I am not certain what the changes would indicate or how the difference in the findings would be relevant. **Further review and research would be needed to determine if the non-dilated exam would allow a complete enough exam to be able to assess for changes, and whether the changes would be beneficial or detrimental to the defense case.** What is clear is that the second, dilated exam contains much more information and many of the findings may not have been present in the first exam.

The elevation of the WBC in the ER could be due to trauma, and **I believe the prosecution will argue the elevation in the WBC is due to the tissue damage in the brain but the neutrophils were low, which is inconsistent with leukocytosis due to trauma** (Santucci, Purcell, & Mejia, 2008). Further review into the trending and any other signs of infection in the following days would be needed to provide further evidence of infection.

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Recommendations:

- I recommend the following expert review and testimony:
 - **Pediatric Radiologist** – to evaluate the likelihood that the injuries are consistent with a hypoxic event.
 - **Child abuse specialist** – to evaluate the clinical aspects of the case
 - **Biomechanical or Biomedical engineer** – to potentially test the strength of our client and determine her ability to cause the injuries.
 - **Forensic Ophthalmologist** might be needed to review the retinal hemorrhages.
Note: Further review and research into the classification of the RH in this case would be needed to ascertain the pertinence of an ophthalmologist expert in this case.
- In preparation of expert review and testimony, I recommend the following UPLNC Services:
 - Location of above experts
 - Preparation of the medical records via organization and a fact chronology, including a comprehensive analysis by an UPLNC nurse.

Thank you for the opportunity to work with you on this case. Please don't hesitate to contact me if you have any questions or concerns.

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