

Scientific Investigation of a Fatal Bicycle Ride to School¹

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KEYWORDS

Death Investigation, Hair Microscopy, Bloodstain Pattern Analysis, Bicycle Accident, Crime Scene Reconstruction.

ABSTRACT

A young girl died while riding her bicycle to school one day. Investigators determined that her death was a result of a fall from her bike. A scientific analysis of microscopical evidence and bloodstain patterns strongly indicated another conclusion.

THE FACTS

On a clear fall day in October, 1996, Kristie Talley and a friend were riding their bicycles to school, eager to start their days in fourth grade. Kristie pedaled along the side of the road while her friend rode on the sidewalk, approximately eight to ten feet ahead. A school bus approached them from behind and prepared to stop at the intersection about 100 feet away. As the bus made its way around the curve and passed Kristie, the children looking out the right side windows suddenly cried out, "Stop! Stop! That little girl fell off her bike."

The bus driver pulled up to the stop sign and disembarked to check on Kristie, who was lying on the street. What he came upon was a horrific sight: the bicycle was sprawled on its left side and Kristie was immobile in a pool of blood. The emergency 911 center was notified and quickly, an ambulance, a fire engine, and police cruisers were dispatched.

A number of officials soon arrived at the scene. The responding paramedics cut away the leather

jacket and examined Kristie; they were stunned to find no signs of life. The police observed the large coagulating pool of blood beneath the bicycle, as well as Kristie's backpack, jacket, and Chicago Bulls ball cap on the street. They conferred and decided that the 10 year-old girl had fallen off of her bike and had died as a result of the fall. Inexplicably, the police authorized the removal of the body to the hospital before any photographs were taken. Subsequently, the police also removed the bike from its point of landing while they roped off the scene. At some point, they decided that photos should be taken, so the 24-inch bicycle was replaced close to its original position, but, despite this attempt, the scene had been irrevocably altered. A representative sample of the photographic record is shown here (Figures 1-2). A close examination of the bicycle revealed that, in addition to the handle bars being turned slightly to the left, the seat, instead of



Figure 1. Looking west toward bicycle with intersection in distance.

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Figure 2. View of bicycle in street over blood with cap, jacket, and backpack.



Figure 3. Bicycle in police station.

facing the typical straight-ahead (north) position, was turned 90° to the right and faced the east position. Some type of force was obviously involved for this to happen, but apparently, this fact was not considered in the officials' final conclusion.

At the hospital where Kristie's body was transported, x-rays taken of the victim's head and neck region revealed a fracture at the third cervical (C-3) vertebrae. A series of twelve photographs was made and were the only pictures known to have been taken of the victim. The parents were notified and understandably devastated by the news. A short time later, they authorized their daughter's cremation, and all too quickly, the body of Kristie Talley was reduced to ash.

The bicycle, clothing, and backpack were transported to the police station and logged in as evidence. Figures 3 and 4 are photos taken of the bicycle; in addition to the pictures showing the bicycle seat turned perpendicularly, Figure 4 clearly shows a drop of blood having fallen, striking the chrome-plated turn signal switch and dripping forward. Despite this and other physical evidence, the police and county coroner continued to maintain that Kristie had died as a result of having fallen off of her bike.

THE SCIENTIFIC ANALYSIS

In April 1999, I was employed at Microtrace and we were engaged by the Talley family attorney to examine the evidence in this case. We were asked to determine whether or not the facts clearly supported the official conclusion, or was some other explanation possible regarding the cause of death of the young girl.

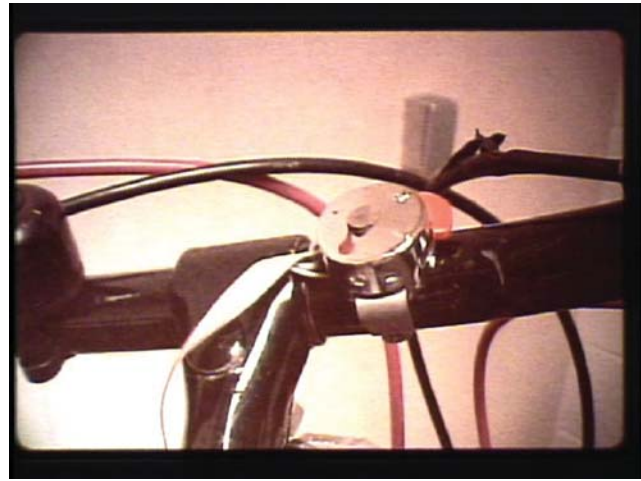


Figure 4. View of bicycle turn signal switch with bloodstain.

A review of the basic principles of bloodstain pattern analysis is essential here. Blood, as is the case with all liquids, does not fall through the air in a "teardrop" form, but rather in an undulating spherical shape, similar to that of a round water balloon. Competing forces called surface tension (on the outer surface of the drop) and internal cohesion¹ hold the falling liquid together until it either lands on a surface or external force is applied to it, the latter causing it to break apart into innumerable tiny droplets. The more force that is applied, the smaller the resulting droplets will be. The direction of flow can be determined by the resultant shape of the drop; the tail, or the narrowing lower portion, indicates which way the blood was flowing at the time it struck the target surface² (Figure 5). The determination of this direction may be important

when trying to recreate events immediately preceding and following the shedding of blood.

We were able to take possession of various items of evidence, including Kristie's bicycle, her jacket, backpack, and ball cap, as well as photos of the scene and victim at the hospital. An examination of the scene photographs confirmed the large quantity of blood, the turned bicycle seat, and the locations of the jacket, the cap, and the backpack. Each of these exhibits demonstrated unique characteristics which were necessary in recreating the totality of events; these helped to guide our investigation and formulate our hypothesis as to what we believed happened.

The first item we examined was the bicycle. Figure 6 shows a representative sample of what we encountered: not only was there a larger bloodstain on the chrome turn signal switch, but many other smaller stains scattered on the handlebars, frame, and reflector, indicated by the triangular arrows. Since the distribution of the blood was undoubtedly affected by gravity and force, it was an obvious conclusion that the source of the bloodstains must have been above the bike before it fell onto the street.

Next, we studied Kristie's ball cap (Figure 7). The right side of the bill of the cap demonstrated a buckle or indented edge. Inside were bloodstains and several Caucasian head hairs, denoted by the triangular arrows. A microscopical examination of the roots of these hairs revealed that each was in their anagen stage³, indicating that they were forcibly removed from the scalp and were not naturally shed. If Kristie were

wearing the cap backwards on her head at the time of the accident, then these two factors indicated that some sort of force was applied to the back of her head at some point prior to her falling.

Kristie's leather jacket, which was cut off her body by paramedics at the scene, can be seen in Figures 8 through 10. The bloodstains seen at the right shoulder and the top snap were damaged due to handling, but all bear the unmistakable appearance of having flowed downward, since the tails of each stain are lower and all point down. This confirmed our hypothesis that the source of the blood originated from above and occurred some time before Kristie and the bicycle fell to the ground.

At this point, the existence of other photographs (Figures 11 through 13) of the victim surfaced. It is not uncommon for "new" evidence to be "discovered" during the course of an investigation, and this case proved to be no exception. Figure 11 is a Polaroid and depicts the victim after she was bandaged up by the paramedics at the scene, as she was being loaded onto the ambulance. It is apparent that the gauze and kling used to wrap Kristie's head is thoroughly soaked with blood, indicating that her head was the source of the blood. The next two pictures are black and white photographs taken by the local hospital emergency room staff. These clearly show some blood exuding from both ears of the victim, indicating a bilateral blood flow from some type of internal head injury. A review of an anatomy book⁴ revealed that the vertebral artery travels through the spinal column and a rupture

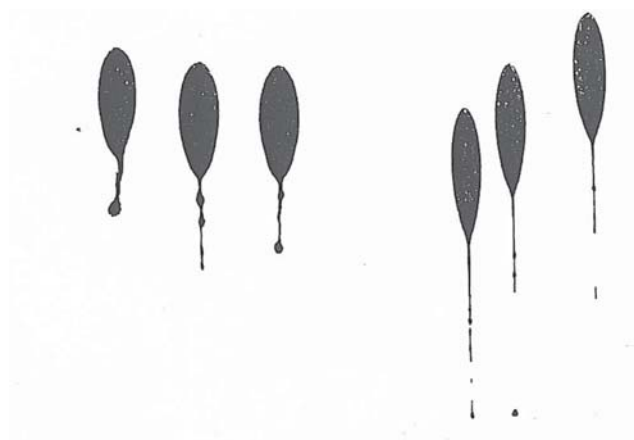


Figure 5. Numerous bloodstains demonstrating direction of downward travel.

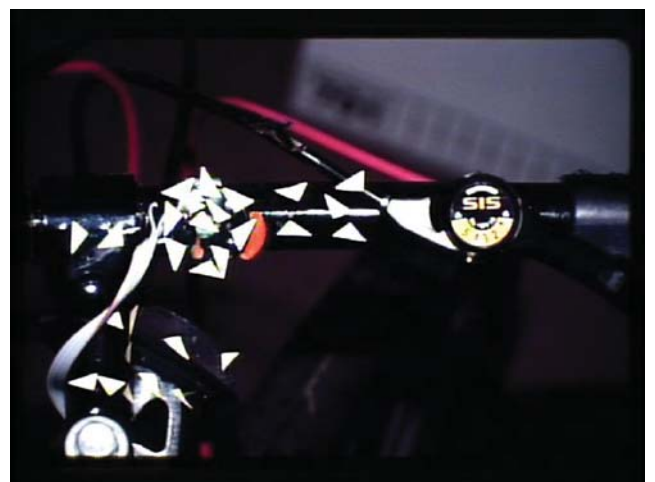


Figure 6. Photo of arrows indicating bloodstains on handlebars.

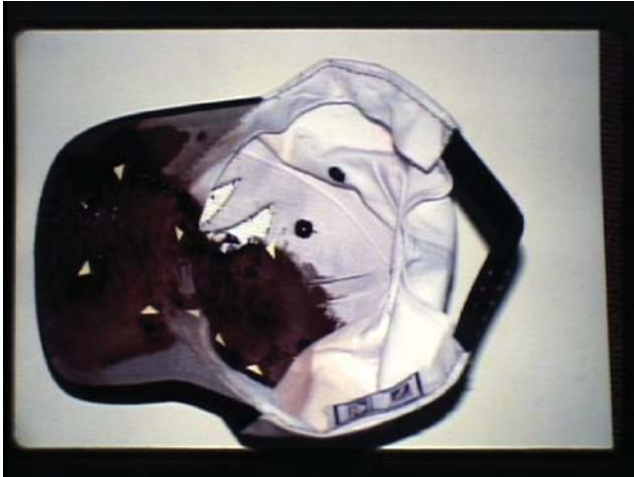


Figure 7. Underside of cap with arrows indicating pulled head hairs. The buckled right edge of the bill is evident.



Figure 8. Overall view of victim's jacket.

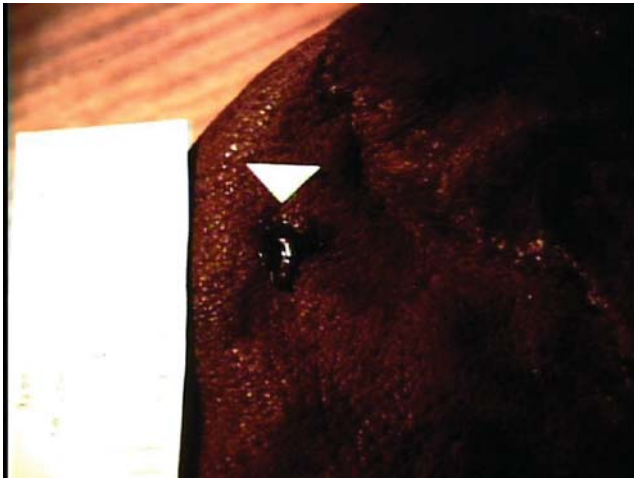


Figure 9. Right shoulder of jacket with arrow indicating direction of blood drop.



Figure 10. Top snap of jacket with arrow indicating direction of blood drop.



Figure 11. Polaroid of victim showing heavy blood flow on left side of head.



Figure 12. Photo of victim in hospital with blood pooled in left ear.



Figure 13. Photo of victim in hospital showing blood in right ear.



Figure 14. View of another bicycle in relation to bus right side mirror.

of this artery (possibly caused by force or a broken vertebrae) could well have been the reason for the blood flow from both ears.

THE CONCLUSIONS

After we had finished our examination of all the items, we drew the following conclusions based on our observations and review of the other documentation:

1) The perpendicular bicycle seat (and other factors not addressed in this context) strongly indicated external force was applied to the victim while she rode her bike;

2) The forcibly removed hairs found inside the cap and buckled bill supported the hypothesis that the victim was struck in her rear head/neck region;

3) The x-rays taken at the hospital revealed that, as a result of this applied force, Kristie suffered a broken neck, and most likely the torn artery in the area of her cervical spine was the source of the shed blood;

4) Blood drops found on the clothing and bicycle proved that the bike was upright at the time the force was applied and that the blood was shed almost instantly after Kristie was struck; and

5) Clearly, the only reasonable conclusion we could reach that fit all the facts was that the school bus had come in contact with Kristie, breaking her neck and killing her instantly. Several photographs of the school bus taken at a later date (depicted in Figure

14) show the side view mirror extending out from the right windshield area and demonstrate the mechanism by which we believed that the bus most likely struck Kristie while she rode her bike to school.

THE RESULTS

Our conclusions were forwarded to the family attorney, who filed suit against the bus company. After a five-year litigation process, the involved insurance companies agreed to pay the parents \$1.5 million dollars to settle the case. The driver was not charged with any crime in this case, since the police and coroner's office continued to stand by their original conclusions.

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