Fulton County

Fulton County Medical Examiner

430 Pryor Street SW
Atlanta, GA 30312
404-613-4400

Case Number 15-1471

Name [First] Bobbi
[Last] Brown

Age, Race, Sex 022 B F

Cause of Death **Lobar pneumonia**
due to **Hypoxic ischemic encephalopathy, delayed effects**
due to **Immersion of face in water complicating mixed drug intoxication**

Other Conditions

Manner of Death UNDETERMINED

Found in water-filled bathtub. Used opiate, cocaine, and benzodiazepines.

Medical Examiner(s) Karen E. Sullivan, MD

Procedure Autopsy — Monday, July 27, 2015 — 9:00 AM
Karen E. Sullivan, MD

Signatures: Karen E. Sullivan, MD 4 March 2016

Print date: 9/22/2015
Referrals: None

REASON FOR PERFORMING AN EXAMINATION:

This 22 year old black woman was found unresponsive in a bathroom tub in her home with her face reportedly immersed in water. She was transported to North Fulton Hospital where she was diagnosed as having suffered an anoxic brain injury. After approximately a week she was transferred to Emory University Hospital, and then DeKalb Rehabilitation Center before being admitted to Peachtree Christian Hospice. She died on July 26, 2015 approximately six months after her original hospitalization.

SUMMARY OF FINDINGS:

I. Hypoxic ischemic encephalopathy (anoxic brain injury).
   - A. Reported finding of decedent in water-filled bathtub and face immersed in water.
   - B. Mixed drug intoxication; antemortem testing performed on hospital blood specimen per NMS Labs.
     1. Morphine level 8.9 nanog/ml.
     2. Recent cocaine use; benzoylecgonine level 300 nanog/ml.
     3. Benzodiazepine use.
        - a. Clonazepam level 12 nanog/ml.
        - b. 7-amino clonazepam level 100 nanog/ml.
        - c. Alprazolam level 5.4 nanog/ml.
     4. Marijuana use.
        - a. Delta-9-tetrahydrocannabinol (active marijuana ingredient) level 1.9 nanog/ml.
        - b. Delta-9-carboxy-9-tetrahydrocannabinol (inactive metabolite) level 11 nanog/ml.
   - C. Seizure disorder as a result of hypoxic ischemic encephalopathy.
   - D. Bilateral lobar pneumonia.

II. Ancillary Studies.
   - A. Postmortem toxicology results per NMS Labs.
     1. Blood acetaminophen level 21 mcg/ml.
     2. Blood phenobarbital level 85 mcg/ml.
     3. Blood clonazepam level 11 nanog/ml.
     4. Blood 7-amino clonazepam level 86 nanog/ml
     5. Blood morphine level 380 nanog/ml.
     6. Blood levetiracetam level 6.1 mcg/ml.
     7. Blood phenytoin level 32 mcg/ml.
     8. Blood topiramate level 13,000 nanog/ml.
     9. Blood lacosamide level 12 mcg/ml.
   - B. Laboratory results per Grady Memorial Hospital.
     1. Vitreous fluid glucose level 111 mg/dl (mildly elevated).
     2. Blood hemoglobin A_{1C} level within normal limits.
     3. Vitreous fluid urea nitrogen level 40 mg/dl (mildly elevated).

4. Vitreous fluid creatinine level within normal limits.
5. Hemoglobin phenotype AA.

CAUSE OF DEATH:

Lobar pneumonia.
Due to: Hypoxic ischemic encephalopathy, delayed effects.
Due to: Immersion of face in water complicating mixed drug intoxication.

MANNER OF DEATH:

Undetermined.

OPINION:

It is my opinion that Bobbi Kristina Brown died as a result of lobar pneumonia which was a delayed complication of hypoxic ischemic encephalopathy due to mixed drug intoxication and immersion of her face in water. Hypoxic-ischemic encephalopathy is defined as brain injury due to asphyxia. The primary causes are systemic hypoxemia (low blood oxygen levels) and/or reduced cerebral blood flow.

Pneumonia (infection of the lungs) results in accumulation of protein and white blood cells in the alveolar (air) spaces. The presence of these materials prevents the normal exchange of oxygen and carbon dioxide in the lungs. In pneumonia, bacteria and viruses from the upper airways or, less commonly, from the bloodstream spread to the lung tissue. Once there, a combination of factors (including the type of microorganism and overall health of the person) may lead to pneumonia. Pneumonia may occur in individuals undergoing prolonged mechanical ventilation and in individuals with altered levels of consciousness resulting from seizures, drug intoxication, or head trauma.

Morphine is a drug produced from the metabolism of many opiate compounds including heroin. It depresses the central nervous system and can be fatal by causing respiratory depression and/or coma. Fatality rates are higher in patients who use alcohol and other drugs such as benzodiazepines and/or cocaine. 6-monoacetylmorphine, the demonstrative metabolite of heroin, was not isolated from Ms. Brown's hospital blood sample.

Clonazepam and alprazolam are benzodiazepines. Benzodiazepines are sedatives/hypnotics and prescribed for anxiety relief. All the sedative-hypnotics are general central nervous system depressants. Deaths associated with use of benzodiazepines are caused by respiratory arrest. Alcohol use greatly enhances the activity of benzodiazepines.

Benzoylecgonine, an inactive cocaine metabolite, was identified in Ms. Brown's hospital blood sample, but non-metabolized cocaine was not present. The presence of benzoylecgonine is

suggestive of recent cocaine use. Cocaine causes coronary artery spasms in addition to increases in blood pressure and pulse resulting in the development of dysrhythmias (abnormal heart rhythms). Prolonged dysrhythmias may cause an individual's death as blood does not circulate in an efficient manner to the body's internal organs including the brain.

The circumstances under which Ms. Brown entered the bathtub are unknown. Whether her death was due to intentional or accidental causes are unknown. Therefore the manner of Ms. Brown's death is classified as undetermined.

DATE, TIME, AND PLACE OF EXAMINATION:

Under the provisions of the Georgia Death Investigation Act, an autopsy is performed in the morgue of the Fulton County Medical Examiner's Center on Monday, July 27, 2015 commencing at 0900 hours.

PRESENTATION, CLOTHING, AND PERSONAL EFFECTS:

The body is received supine in a white plastic disaster bag secured with a red plastic seal numbered 0024590. Attached to the plastic seal is a Fulton County Medical Examiner's Center identification tag with the designation "15-1471; Brown, Bobbi K.". The following items of clothing and personal effects are on or accompany the body:

1. White hospital style sheets beneath the decedent's body within the disaster bag.
2. A pink head band and black elastic hairband in the hair.
3. A pink nightgown on the upper extremities and torso.
4. A disposable adult undergarment at the waist.
5. A cloth doll with light brown and gold clothing with a purple yarn magnetic holder containing printed words on a white placard.
6. White metal jewelry in the right cheek.

The disposable undergarment is discarded. The remaining items are released with the body.

DIAGNOSTIC AND THERAPEUTIC DEVICES AND MARKINGS:

1. A tracheotomy tube in the anterior surface of the neck.
2. A percutaneous gastric tube in the left upper quadrant of the abdomen.

POSTMORTEM X-RAYS:

Twenty-five postmortem x-rays of the head, torso, and extremities are obtained. Neither recent nor remote fractures are noted. No foreign objects are identified.

POSTMORTEM CHANGES:

The refrigerated body retains central warmth. Rigor mortis is generalized and mildly to moderately developed. Violet postmortem lividity is posteriorly distributed except in regions of pressure. The corneas are clear. The vermilion borders of the lips are moist. The body is well preserved.

FEATURES OF IDENTIFICATION:

The unembalmed body is that of an adult black female appearing younger than the reported age of 22 years, measuring 66-1/4" in length and weighing 93 pounds. The decedent has a thin build, is well developed and under-nourished. The brown head hair is 4-3/4" in length. The irides are brown. The natural teeth are in an average state of repair. The left maxillary central and lateral incisors are remotely absent. The left earlobe displays four piercing defects. The right earlobe displays two piercing defect and one full thickness healed vertical defect. Two piercing defects are in the midline of the abdomen just above the umbilicus. The right nostril exhibits a healing/healed piercing defect. The monochromatic tattoo of "222" is on the anterior surface of the left wrist. A monochromatic tattoo of "WEH" on the anterior surface of the right forearm is surrounded by four birds. A monochromatic tattoo of musical notes and scale is on the left lateral torso, extending into the left lower quadrant of the abdomen. A number of well healed scars are on the head and neck, torso, and extremities.

Head and Neck:

1. A 1/16" hypopigmented scar is on the left side of the upper lip.
2. Three scars on the right side of the neck are 1/16" to 3/8" in length and cover an area of 3-1/4 x 1-1/4".
3. A 5/8" scar is on the right side of the neck.
4. Scars on the left side of the neck range from 1/8" to 3/4" and cover an area of 1 x 1/2".

Torso:

1. Two scars on the right side of the upper chest are 1/2" and 1/4" in length.
2. Six scars on the left side of the upper chest range from 1/8" to 1/4" in length.

Extremities:

1. A 1-1/4" oval scar is on the posterior surface of the left shoulder and arm.
2. A 1/4" scar is on the anterior surface of the arm.
3. A 2-1/16" scar is on the posterior surface of the left forearm.
4. A 1/2" scar is on the anterior surface of the left forearm.
5. Four faint horizontal and obliquely oriented scars on the anterior surface of the left forearm are 1/2" to 3/4" in length.
6. Two areas of hyperpigmentation on the anterior surface of the left forearm are 3/4" and 1-1/4" in length.
7. A 1/8" scar is on the posterior surface of the right forearm.
8. A 1-1/2" scar overlies the right lateral malleolus.
9. On the anterior surface of the right foot are two areas of cutaneous hyperpigmentation, measuring 1-3/4" and 1-1/4" in length.

EVIDENCE OF ACUTE INJURY:

1. Cutaneous depressions on each mastoid process are associated with dark purple discoloration of the skin.
2. A 3/4" ecchymosis is in the left antecubital fossa.
3. 1/2" and 1/4" ecchymoses are in the right antecubital fossa.
4. 1" and 1-1/4" ecchymoses are on the anterior and medial surfaces of the left thigh.
5. Two ecchymoses associated with remnants of adhesive/tape cover an area of 2-1/2" on the anterior surface of the right thigh.

EXTERNAL EXAMINATION:

The head is normally formed. The soft tissues of the forehead, cheeks, and chin exhibit acne. The facial bones and mandible are free of palpable fractures. Neither ocular nor facial petechiae are present. The sclerae are anicteric. The conjunctivae are pale. The nose is normally formed. The nasal vestibules are clear. The nasal septum is palpated with forceps and is intact. The lips, teeth, tongue, gums, and buccal mucosa are unremarkable. The external meati, pinnae, and mastoid regions are unexceptional.

The trachea is in the midline of the neck. The neck is neither crepitant nor excessively mobile. No palpable masses are present.

The chest and back are symmetrical and well developed. The breasts are free of palpable masses. The flat abdomen is devoid of organomegaly. The spine is straight.

The extremities are symmetrical and well developed. The appendicular skeleton is stable to palpation and manipulation. The hands and feet are normally formed. All of the digits are present. The nails extend to 1/8" beyond the tips of the digits and are covered with light pink, gloss polish.

The external genitalia, perineum, and anorectal areas are normally formed and atraumatic. The inguinal regions and buttocks are unremarkable.

There is no cervical, axillary, or inguinal lymphadenopathy.

INTERNAL EXAMINATION:

Head:

The scalp is reflected using the standard intermastoidal incision. There is no scalp trauma. The calvarium is intact. The dura is intact and free of discoloration and thickening. The base of the skull is examined after stripping the dura and is intact. The leptomeninges are thin and transparent. There is no epidural, subdural, or subarachnoid hemorrhage. The brain weighs 1230

grams. The gyri are flattened and the sulci are widened suggestive of cerebral atrophy. There are no lesions of the cortical gray ribbon, white matter, or deep gray matter structures indicative of active natural disease processes. Neither brain swelling nor herniation is noted. The normally distributed blood vessels of the circle of Willis are free of atherosclerosis and aneurysms. The substantia nigra is normally pigmented. The cerebellum, brainstem, upper cervical spinal cord, and ventricular system are normally formed. The cerebrospinal fluid is clear.

Neck:

The skin of the neck is dissected to the angle of the mandible. The tongue is atraumatic. There is no trauma of the soft tissues, airway, or vital structures in the neck. No airway mucosal edema is present. The hyoid bone and laryngeal cartilages are free of fractures and deformities. The epiglottis is neither inflamed nor edematous. No foreign objects are in the airway. The carotid vessels are pliable and patent. The anterior cervical spine and atlanto-occipital joint are stable to manipulation.

Chest and Abdomen:

The skin of the chest and abdomen is reflected using the usual Y-shaped incision. The subcutaneous fat is 5/16" in thickness at the level of the umbilicus. The subcutaneous fat and musculature are free of injury. The sternum and chest plate are intact and upon their removal no abnormal fluid collections are in the body cavities. No unusual odors or color changes are present. Examination of the organs in situ reveals normal organ morphology and relationships. The intact diaphragm is normally formed. The organs are removed using the Virchow technique.

Cardiovascular System:

The heart weighs 230 grams and exhibits normal four-chambered anatomy. The ventricles are of normal thickness. The widely patent coronary arteries arise from their usual locations, ramify across their respective ventricles, and demonstrate right dominant distribution. The epicardium, valve leaflets, chordae tendineae, and endocardium are normally formed. The foramen ovale is probe patent. The brown myocardium is free of discrete lesions. The aorta and its normally distributed major branches exhibit minimal atherosclerosis.

Respiratory System:

The trachea, hilar structures, and major vessels are normally formed and atraumatic. The right and left lungs weigh 410 grams and 330 grams respectively. The pleural surfaces are smooth. The parenchyma of the lower lobes is congested with the expression of blood from the cut surfaces upon compression. Neither lung exhibits thrombosis, embolism, infarction, or neoplasia.

Gastrointestinal System:

The esophagus is lined by unremarkable tan-gray mucosa. The gastroesophageal junction is unremarkable. The gastric mucosa is normally rugated and the stomach contains a scant amount of light green fluid. A percutaneous gastrostomy tube terminates in the fundus. There are no lesions of the mucosa, wall, or serosa of the small bowel, colon, or rectum. No foreign objects are in the gastrointestinal tract. The appendix is in the right lower quadrant of the abdomen.

Hepatobiliary System:

The liver weighs 1890 grams. The intact capsule is of normal thickness. The homogenous, brown parenchyma is free of mass lesions. The gallbladder contains approximately 10 ml of viscous green bile. The mucosa is unremarkable. No gallstones are present. The pancreas is of normal size, has the usual lobular architecture, and free of fibrosis, hemorrhage, and fat necrosis.

Urogenital System:

The right and left kidneys weigh 150 grams and 160 grams respectively. The capsules strip with ease to reveal smooth cortical surfaces. The cut surfaces including the pyramids, pelves, calyces, and vessels are unremarkable. The ureters are of normal caliber. There are no lesions of the mucosa, wall, or serosa of the empty urinary bladder. The nongravid uterus is free of leiomyomata. The endometrium and myometrium are 0.1 cm and 1.2 cm in thickness respectively. No endometrial lesions are present. The ovaries, fallopian tubes, cervix, and vaginal mucosa are unremarkable.

Reticuloendothelial System:

The spleen weighs 130 grams. The intact capsule is of normal thickness. The cut surface is dark red. The red pulp and white pulp are normally distributed. No focal lesions are present. Regional lymph nodes are unremarkable. The thymus gland weighs 20 grams and partially replaced by mature adipose tissue. The residual gray-white parenchyma is free of discrete lesions.

Musculoskeletal System:

The axial skeleton is intact. The lateral aspect of the left 9th rib is slightly irregular by palpation without definitive fracture. The symmetrical skeletal muscles are unremarkable.

Endocrine System:

The symmetrical thyroid gland is of normal size. The golden parenchyma is free of nodules, hemorrhage, and cysts. The adrenal glands are of normal size and free of hemorrhage and nodularity. The grossly unremarkable pituitary gland is of normal size.

MICROSCOPIC DESCRIPTION:

Seventeen hematoxylin and eosin stained slides of the heart (including the conduction system), lungs, gastrointestinal tract, liver, pancreas, spleen, lymph nodes, thymus gland, kidneys, uterus, ovaries, thyroid gland, adrenal glands, pituitary gland, and brain are examined.

Cardiovascular System: Sections of the heart reveal focal mild interstitial fibrosis in the region of the atrioventricular node. Neither acute nor chronic inflammation is evident.

Respiratory System: Each lung exhibits lobar pneumonia. Acute intra-alveolar inflammation is evident in one lobe of the right lung and each lobe of the left lung. In addition, the left lung demonstrates interstitial neutrophilic and lymphocytic inflammation. Increased numbers of intra-alveolar pigmented macrophages are present in sections of both lungs.

Brain: Sections of the cerebellum reveal decreased numbers of Purkinje cells.

The remaining histologically unremarkable tissue sections confirm the gross impression.

OTHER PROCEDURES:

1. Blood is submitted to NMS Labs for toxicologic analysis.
2. Vitreous fluid is submitted to Grady Memorial Hospital for electrolyte analysis and beta-hydroxybutyrate quantitation. Blood is submitted for hemoglobin A_{1C} and hemoglobin phenotype evaluation.
3. An air-dried blood spot card is retained in this facility.
4. Documentary and identification photographs are obtained.
5. Representative tissue sections are processed to slides in 17 cassettes.
6. The examined organs are returned to the body cavity.
7. Serum and blood samples are retained in this facility.
8. The clothing and personal effects are handled as described in the text.
9. Records from Emory Johns Creek Hospital, Rural Metro EMS, North Fulton Hospital, Emory University Hospital, DeKalb Medical Long Term Acute, and Homestead Hospice are reviewed.

KES:sm

Dictated: 07/27/2015
Transcribed: 07/28/2015
Finalized: 09/22/2015