Bodies & Autopsies

There is a plethora of different observations and procedures which may be utilized upon the discovery of a dead body. Coroners and pathologists spend a lifetime honing their judgment in such cases. This chapter will discuss the basic procedures followed concerning the treatment of bodies with explanations for a few simple occurrences. These are in no way inclusive and are only a sample of what is or may be done concerning possible treatment of a body.

Identifying Dead Bodies

Most deaths occur in the presence of friends and family with little question as to their identity. Often family members are asked to officially identify a body. When deaths occur in family’s absence, the deceased usually has some sort of identification such as a driver’s license or passport. However, when a body or portion of a body is discovered but unidentified, other methods are necessary.

Fingerprints are a mainstay used in identifying unknown bodies. There are a few problems which may inhibit identification through fingerprinting. Fingerprints must be matched to a known set of prints on file. A lot of people never have their prints taken by an official organization, unless they are arrested or their job requires it. Occasionally a body is found without fingers, or with prints in a condition which makes them impossible to read. Fingerprints are unique and an excellent tool for identifying bodies, but alone they are inadequate.
Another mainstay in the identification of disfigured or partial bodies is dental records. Although not as unique as fingerprints, dental records are fairly conclusive. Anyone who visits a dentist is required to have their teeth X-Rayed on a regular basis. Dentists keep these documents on file, as well as the detailed records of dental work performed. Teeth are extremely resilient and often remain intact after death. When these records are paired with other evidence, they are enough to make a positive match.

DNA has become an invaluable tool in the pursuit of identifying an unidentified body (see the next unit in this book). In recent years, scientists have made it possible to withdraw usable samples from many different sources. DNA typing however has to be matched to a known sample, but DNA samples are not kept on record as are fingerprints. A control sample may be taken from a location containing known DNA. Such locations are often easy to identify in a person’s daily routine. For example, known DNA samples could be found in a hairbrush, a razor, or many other household objects. Left, some of the instruments used to take samples from an individual. These are the samples which most likely contain DNA. If a control sample proves elusive, it is possible to take samples from close family members and deduce relation to a body in question. Obtaining these samples, however, require knowledge of possible identities. If there is not enough evidence to point to a suspected identity, an investigator may not be able to obtain the crucial control sample.

**Reconstructing the Unidentified (Medial Imposition)**

Although the previously mentioned methods are often successful in the identification of an unknown body, there are circumstances which make it impossible to achieve a positive identification. Such is the case with bones, skulls, and some mutilated bodies. In addition, most identification methods require some suspicion of who the person is before any conclusive tests can be performed. Often friends and family of missing persons are shown pictures of a body or body marks, such as tattoos, to get a lead on an unidentified body.

Personal identification through the examination of bones has long been a goal of scientists. Some experts devote the careers to the relationship between the appearance of bones and physical features. There is much information to be gained by examining the actual bones of a victim. Characteristics such as height, weight, gender, muscle mass, and many others, can be estimated quite accurately by a practiced anthropologist.
Another goal of the scientists is to reconstruct facial features from a skull. Medial imposition is the process of using the features of a de-fleshed skull to reconstruct the features of a victim’s head and face. This may be accomplished by examining the shapes of specific areas of the skull and slowly placing material matching the thickness and shape of the missing organic matter to the skull. Such reconstructions have proven extremely accurate and thus helpful in many cases. This may also be accomplished with the assistance of a computer and sophisticated graphics software. Computer models of this type are quicker, but slightly less accurate and two-dimensional.

Sculpture progression by Angela Janick
The Coroner

When a death occurs outside of a controlled environment, such as a hospital, the coroner is called to rule on the death. Most coroners are not medical doctors. In areas with larger populations, the coroner may be a doctor or a medical examiner. However, in most cases the coroner is simply an elected official trusted with the job of ascertaining cause of death. He uses many sources, including the autopsy results and professional opinions, to help him ascertain the cause of death.

The coroner is also responsible for notifying the deceased’s next of kin. He may delegate this responsibility to a police officer or a deputy. In many cases, these family members are asked to come into a hospital or medical facility for the informing of a loved one’s death. A person may become mentally or physically unstable upon learning such disturbing news. In such situations, being in close proximity to medical facility is quite advantageous. A coroner also has the authority to open past cases of death. This includes the authority to question witnesses, investigate scenes or evidence, and even to order exhumation.

Determining Cause of Death

The coroner is responsible for ascertaining the cause and mechanism of death. He is the chief official in charge of the body. If an individual dies in a hospital or under hospital care (such as hospice) a doctor will most often determine cause of death and sign the death certificate; the coroner would not be utilized. Most other deaths however, fall under the jurisdiction of a coroner. In cases of criminal activity, he is often required to work closely with law enforcement officials during investigations. He may even be involved with investigational activities, like interrogations. A detective is best able to pursue truths related to criminal activities, while a coroner is more adept at discovering factors in death.

In Home Deaths

If someone dies in their home under family care, the corner is responsible. If the deceased’s situation is well known, the coroner may elect to have the body picked up by a funeral home, where he will examine the body in the absence of friends and family. However, it is often the case that a coroner must visit a home to pronounce cause of death. The coroner will check the body for bruises, sores, and mistreatment. He will also evaluate the quality of care provided. The coroner will examine care practices by talking with friends, family, and doctors. This may involve checking that medications were administered correctly or looking for evidence of foul play.
Crime Scene Deaths

At any crime scene involving a corpse, initially police officers take charge and restrict admittance. When the coroner arrives, he will take many pictures, and then examine the body and immediate surroundings. If the coroner and/or detectives feel that criminal acts are possible, they work together to further the investigation. In either case the coroner will question witnesses, family members, or anyone else to help him ascertain the cause of death. Different circumstances warrant more or less questioning.

Vehicular Accidents

The coroner is responsible for determining the cause of death in vehicular deaths. In these types of deaths it is often vital to determine the mechanism of death--even more so when multiple vehicles are involved. Whether the cause is medical, driver error, or drugs, responsibility for criminal action and infliction of death or injury to innocent parties must be investigated. For these purposes, fluid is always taken from the body and tested for the presence of drugs or alcohol. This can be done in several ways. Several different fluids may be used in pursuit of such information.

Vehicular accidents may cause such damage to some organs as to render them useless for analysis. One of the more common practices is to take fluid from the heart. Below, a needle which may be used to extract fluid from the heart and possible toe tags. If the heart is damaged or unobtainable, then urine from the bladder will suffice. If these sources are not adequate, then the vitreous of the eyeball (fluid in the eye) may be used. Above, a syringe a tube used to extract and store the vitreous. Such a procedure deflates the eye, but the coroner injects water back into the ball for re-inflation. If none of the normal procedures are possible a coroner may choose to get blood from the body at the morgue, when it is drained for embalming. However, in the case of an ordered autopsy, cerebral fluid from the spinal column will be utilized.
What Warrants an Autopsy?

The coroner has the power to order an autopsy for any suspicious death. Reports from the average autopsy, takes 4 to 6 weeks to complete. Regardless of circumstances of a death scene, the coroner will check the body for bruises, sores, mistreatment, or suspicious items. He will take statements from witnesses and doctors if they were in contact with the scene. Often medications and medical history are examined as well. If the coroner cannot find a medical history or a doctor with a medical reason why an individual died, then the coroner may order an autopsy. Under most state laws, if there is any question of cause of death in the coroner's opinion, an autopsy is warranted. Autopsies reveal the cause of death 98% of the time. The remaining 2% result in an undetermined cause of death.

An autopsy is required in all homicide cases, even when the cause of death seems certain. The structure of our judicial system is a largely the reason for this practice. Many defense lawyers attempt to get an acquittal by drawing into question the exact cause of death. In such cases, there is no substitute for the testimony of a professional medical examiner to rule on the cause of death.

Most drownings require an autopsy. The first question to be answered is if the person actually drowned or died before being placed in water. Foam coming from a victim’s mouth indicates that he did in fact drown. If drowning is the official cause of death, it may then be necessary to investigate the circumstances leading to the death. Could the person swim? Is there evidence of a struggle? How long was the body in the water? These and many other questions can likely be answered by an autopsy.

Many auto accidents are autopsied. Although fluids may be taken in advance of an autopsy to check for the use of drugs or alcohol, there may remain a need to examine other possible extraneous causes of death. Did the driver fall asleep? Perhaps a medical condition, such as a heart attack or stroke, was a factor. Is driver error the only possible cause, or is foul play involved?

Nearly all children's deaths are autopsied. Children are not expected to die under normal circumstances. Obviously an autopsy will check for evidence of abuse or a medical condition. Often the autopsy reveals some type of hereditary problem which could warn other family members with the same potential defect.

When a body is autopsied, a blood sample is kept on file; these samples are usually kept for thirty years. This may seem unnecessary, but in the case of a death, new issues may arise in the future. For example, if the deceased has an estate or life insurance, a may claim relation years latter. In such cases, a simple DNA test could ascertain the true identity of the claimant.
Autopsies

Autopsies are performed all over the world for a number of reasons. Autopsies yield valuable information about the cause of death and about evidence related to the process of death. There are several different ways to organize and carry out this procedure. The following paragraphs will discuss the most common practices. Although some pathologists may choose to perform them differently, each serves the same purpose and is performed by professionals with respect to the patient and their family. If the coroner orders an autopsy, the state performs and pays for it to be completed. Though not common, a large hospital may pay for an autopsy. These autopsies, unlike one ordered by the coroner, requires the family's permission. If a family member orders an autopsy, he or she must pay for it. A private autopsy currently runs about six to eight thousand dollars.

An autopsy is a routine postmortem examination performed by a pathologist on a patient who has died. Most patients who die do not undergo an autopsy. An autopsy may be requested by the deceased’s doctor or surviving family. After an individual passes away, his body is wrapped in a sheet or shroud and transported to the morgue, where it is held in a refrigeration unit until the autopsy is conducted. Small hospitals usually have to send bodies out to be autopsied, while larger hospitals keep a pathologist on staff.

An autopsy is normally performed by a team of three; a diener, a prosector, and the pathologist. The diener is the least educated of the three. He normally does most of the more physical work. The diener is often a person who is in college planning on going into the medical field. The prosector is usually an anthropologist-in-training. The pathologist performs the majority of the actual autopsy, while the anthropologist monitors and assists as needed.

Dress

Autopsy attendants wear fairly simple protective equipment, including scrubs, gowns, two pairs of gloves, shoe covers, and a plastic face shield. This equipment is used as a precaution to prevent fluid transfer. Some autopsies require sealed-environment suits. This is the case when patient has died of an unknown infectious disease or of certain extremely contagious pathogens. This type of protective garb is extremely difficult to work in and requires a specialized facility.
External Examination

After the body is retrieved from the cooler, the body is measured, weighed, and placed on the autopsy table. Right: The autopsy table is a waist-high aluminum slab plumbed for running water with faucets and spigots to facilitate draining blood and other bodily fluids. This table is simply a slanted tray with raised edges. A body block, seen below, is placed under the patient's back. This rubber or plastic block causes the chest to protrude upward while the arms and neck fall downward. This position best arranges the body cavity for dissection. Finally the external surfaces are examined for abnormalities. This includes such procedures as fingernail scraping, fingerprinting, and photography of any surface injuries.
Disection of the Main Trunk

A large scalpel is used to make a Y-shaped incision in the trunk. The top legs of the Y-incision extend from the front of each shoulder to the bottom end of the breast bone. In women, these incisions may be diverted beneath the breasts, so that the "Y" is curved, rather than straight. The bottom part of the Y extends to the pubic bone making a slight deviation to avoid the navel. This incision is deep. It extends to the rib cage on the chest, and through the abdominal wall below.

After making the Y-incision, the skin, muscle, and soft tissues are pulled from the chest wall. This is done by pulling back each of the three sections while cutting it away with a scalpel. When complete, the front of the rib cage and the front of the neck are exposed. Next, an electric saw or bone cutter is used to open the rib cage. One cut is made up each side of the front of the rib cage, so that the chest plate is no longer attached to the rest of the skeleton. This may also be performed by snipping the ribs on each side of the chest plate. The chest plate is then pulled back and peeled off. As in the Y-incision, a scalpel must be used to cut the connective tissue as the chest plate is extracted. Then the pericardial sac is cut open to expose the heart. Usually a finger is inserted into the pulmonary artery to feel around for blood clots, a common cause of death in hospitalized patients.
The Organs

There are two common methods of organ removal. The "Rokitansky method" requires the removal of all the organs of the trunk at once. The dissection begins at the neck and proceeds downward, so that eventually all the organs are removed from the body in one bloc. This allows one person to work on the organs in the bloc, while a second person works on the rest of the body. The other option is to take these organs out one at a time. Either method accomplishes the same objective and is basically personal preference of the attending pathologist.

All organs in the body undergo the same basic procedure. They are separated from the other organs and weighed. They are then examined for abnormalities. Initially the organ is inspected as a whole. It is then sliced and examined in small cross sections. Finally, a small representative piece is saved for subsequent biological and chemical analysis. Left, containers used to store samples of organs while waiting for biological analysis. These cuts are made with a long (12" - 18"), sharp knife, called a "bread knife" or a pair of scissors.

Running the Gut

When the stomach, intestines, and bowels are removed, they must be inspected for contents as well as abnormalities. This task is called "running the gut". After opening the stomach, the contents must be laid out and inventoried. The intestines and bowels are irrigated to force out all contents. This content must be inspected for any substances which could be significant. Organic material is sent to the lab for biological and chemical analysis.
Removing the Brain

The removal of the brain begins with placing a body block under the back of the head. Using a scalpel, a deep cut is made from behind one ear, over the crown of the head, to the other ear. The skin and soft tissues are then divided into a front flap and a rear flap. The front flap is pulled forward over the patient's face exposing the top and front of the skull. The rear flap is then pulled backwards over the neck, exposing the entire top half of the skull (left).

With the scalp out of the way, an electric saw is used to make a cut around the equator of the cranium. This cut must be deep enough to cut all the way through the skull, but not deep enough to cut the brain. Usually the cuts are made so that a “V” is formed on each side of the skull. This yields a wedge so that the skull top will not slide off the bottom half of the skull after the autopsy is completed. After this cut, the wedge is removed (right). As this wedge pried loose, there is a very characteristic sound which emanates from the skull. It has been described as a combination of a sucking sound and the sound of rubbing two halves of a coconut together.
After the top of the brain is fully exposed, it is relatively easy to remove it. Basically the only thing holding the brain in place is the spinal cord. Once the spinal cord is cut the brain is gently lifted out of the skull. The brain is extremely soft and easily deformed; it is not usually examined or dissected at the time of the autopsy. A normal brain is white with little blood. In the picture to the right, the brain is covered with blood indicating some type of trauma. Before a detailed examination, the brain is hung up by string in a jar of formaldehyde for a couple weeks. The formaldehyde fixes the tissue, preserving it from decay and firming it for ease of handling. After fixation the brain is removed and rinsed. The brain stem is separated from the rest of the brain with a scalpel. Each part is then sliced and laid out in cross sections for examination. Sections of each are collected and sent to the lab for microscopic and chemical analysis.

Closing Up

At this point of the autopsy, the body, void of all organs and the chest plate, is an empty shell. First, the skull cap is placed back on the skull and the scalp is pulled back into place. Using a baseball stitch, the scalp is sewed back together. Although the brain is not replaced, many institutions replace the sliced organs by pouring them back into the body cavity. Others have the organs incinerated. In either case, the chest plate is placed back in the chest, and the skin sewn with baseball stitches. The wound once again resembles a "Y." The body is then cleaned and covered until picked up by the mortician.
AUTOPSY REPORT

NAME: Jane Doe

DOB: 09/13/88 DEATH D/T: 6/26/03@ 11:21
AGE: 14Y AUTOPSY D/T: 6/27/03 @ 9:30
SEX: F ID

PATH MD: Dale Dolitte
FINAL DIAGNOSIS:

I. Ligature Strangulation
   A. Circumferential ligature with associated ligature of the neck
   B. Abrasions and petechial hemorrhages of the neck
   C. Petechial hemorrhages of eyes

II. Cranio Cerebral Injuries
   A. Scalp contusions and abrasions
   B. Linear fracture on right side of the skull
   C. Subarachnoid and subdural hemorrhage
   D. Contusions of temporal lobes

III. Abrasions of Left Cheek

IV. Abrasion on Posterior Right shoulder

V. Abrasion and Vascular Congestion of Vaginal Mucosa

VI. Ligature of Right Wrist
TOXICOLOGIC STUDIES

blood ethanol - 0.06

blood drug screen - no drugs detected

CLINICOPATHOLOGIC CORRELATION

Cause of death of this fourteen year old female is asphyxia by strangulation associated with cranial cerebral trauma.

The body of this fourteen year old female was first seen by me after I was called to an address identified as 4663 Brownter Ave, Foxlin, Kentucky, on 6/23/03. I arrived approximately 11 p.m. on 6/23 and entered the parking lot where the decedent's body was located. I viewed the body in the back seat of a four door sedan. The decedent was laying on her back on the backseat, covered by a blanket. On removing the blanket from the body, the decedent was found to be lying on her back with her arms extended down by her hips. The head was turned to the left. A quick examination of the body revealed a ligature around the neck and a ligature around the left wrist. Noted was a small area of abrasion or contusion below the left ear on the right cheek. A prominent dried abrasion was present on the lower right neck. After examining the body, I left the scene at 1 a.m.

EXTERNAL EXAM

Decedent is clothed in a short sleeved white knit low cut/high rising shirt, the mid anterior chest area. Tied loosely around the left ankle is a white cord. At the knot there is one tail end which measures 2.5 inches in length with a frayed end. The other tail of the knot measures 12 inches in length and ends in a double knot. This end of the cord is wax sealed. There are no defects noted in the shirt but the upper anterior left sleeve contains a dried brown-tan stain measuring 2 x 1 inches. There is small, thong type, white underwear with an elastic waist band containing a red stripe. The underwear is blood stained interiorly over the crotch area. Small rips are present in this same area of the crotch. These red areas of staining, measure 0.5 inch in maximum dimension.

EXTERNAL EVIDENCE OF INJURY

Located just below the left ear at a right angle of the mandible, below the right external auditory canal is a 1 inch x 1 inch area of rust colored abrasion. In the lateral aspect of the right lower eyelid on the inner surface is a 1 mm in dimension petechial hemorrhage. Several 2 to 3 mm petechial hemorrhages are present on the skin of the upper eyelids bilaterally as well as on the lateral right cheek. Additional, possible petechial hemorrhages located on the conjunctival surface. Possible petechial hemorrhages are also seen on the conjunctival surfaces of the right upper and lower eyelids. Livor mortis on this side of the face makes identification difficult.

Wrapped around the neck with a knot in the midline of the posterior neck is a length of white rope similar to that described as being tied around the left wrist. This ligature cord is cut on the right side of the neck and removed. A single black ink mark is placed on the left side of the cut and a double black ink mark on the right side of the cut. Extending from the knot on the posterior aspect of the neck are two tails of the knot, one measuring 2.5 inches in length and
having a frayed end, and the other measuring 12 inches in length with the end tied in multiple loops around a length of a round metal bare with measures 4 inches in length. This metal bar is pointed at both ends and there are several colors of paint on the surface. Printed in gold letters on one end of the rod is the word "Japan." The tail end of another word extends from beneath the loops of the rope tied around the stick and is not able to be interpreted. Brunette hair is entwined in the knot on the posterior aspect of the neck as well as in the rope wrapped around the metal rod. The white rope is flattened and measures approximately 1/4 inch in width. It appears to be made of a white nylon material. Also secured around the neck is a gold chain with a single charm in the form of a heart.

A deep ligature furrow encircles the entire neck. The width of the furrow varies from one-eighth of an inch to five/sixteenths of an inch and is horizontal in orientation, with a slight upward deviation. The skin of the anterior neck above and below the ligature furrow contains areas of petechial hemorrhage and abrasion encompassing an area measuring approximately 4 X 3 inches. The ligature furrow crosses the anterior midline of the neck just below the laryngeal prominence, approximately at the level of the cricoid cartilage. It is almost completely horizontal with slight upward deviation from the horizontal towards the back of the neck. The midline of the furrow mark on the anterior neck is 10 inches below the top of the head. The midline of the furrow mark on the posterior neck is 6.5 inches below the top of the head.

The area of abrasion and petechial hemorrhage of the skin of the anterior neck includes on the lower left neck, just to the left of the midline, a roughly triangular, parchment-life rust colored abrasion which measures 2.5 inches in length with a maximum width of 1.25 inches. This roughly triangular shaped abrasion is obliquely oriented with the apex superior and lateral. The remainder of the abrasions and petechial hemorrhages of the skin above and below the anterior projection of the ligature furrow are non-patterned, purple to rust colored, and present in the midline, right, and left areas of the anterior neck. The skin just above the ligature furrow along the right side of the neck contains petechial hemorrhage composed of multiple confluent very small petechial hemorrhages as well as several larger petechial hemorrhages measuring up to one-eighth by one-eighth of an inch in maximum dimension. Similar smaller petechial hemorrhages are present on the skin below the ligature furrow on the left lateral aspect of the neck. Located on the left side of the chin is a three-sixteenths by one-eighth of an inch area of superficial abrasion. On the posterior aspect of the right shoulder is a poorly demarcated, very superficial focus of abrasion/contusion which is pale purple in color and measures up to three-quarters by one-half inch in maximum dimension. Several linear aggregates of petechial hemorrhages are present in the anterior left shoulder just above deltoplectoral groove. These measure up to one inch in length by one-sixteenth to one-eighth of an inch in width. On the left lateral aspect of the lower back, approximately sixteen and one-quarter inches and seventeen and one-half inches below the level of the top of the head are two dried purple abrasions. The more superior of the two measures one-eighth by one-sixteenth of an inch and the more inferior measures three-sixteenths by one-eighth of an inch. On the posterior aspect of the right lower leg, almost in the midline, approximately 6 inches above the level of the heel are three small scratch-like abrasions which are dried and rust colored. They measure one-sixteenth by less than one-sixteenth of an inch, one-eighth by one-eighth, and one-eighth by less than one-sixteenth of an inch respectively.
On the anterior aspect of the perineum, along the edges of closure of the labia major, is a small amount of dried blood. A similar small amount of dried and semi fluid blood is present in the skin of the fourchette and the vestibule. Inside the vestibule of the vagina and along the distal vaginal wall is reddish hyperemia. This hyperemia is circumferential and perhaps more noticeable on the left side and posterior. The hyperemia also appears to extend just inside the vaginal orifice. A 1 cm red-purple area of abrasion is located on the right posterolateral area of the 1 X 1 cm orifice. The hymen itself is represented by a rim of mucosal tissue extending clockwise between the 3 and 10:00 positions. The area of abrasion is present at approximately the 6:00 position and appears to involve the hymen and distal right lateral vaginal wall and possibly the area anterior to the hymen. On the left labia major is a very faint area of discoloration measuring approximately one inch by three-eighths of an inch. Incision into the underlying subcutaneous tissue discloses only slight hemorrhaging. A minimal amount of semi liquid thin watery red fluid is present in the vaginal vault. No recent or remote anal or other perineal trauma is identified.

REMAINDER OF EXTERNAL EXAMINATION

The un-embalmed, well developed nourished Caucasian female body measures 62 inches in length and weighs an estimated 100 pounds. The scalp is covered by long brunette hair which is fixed in a ponytail, on top of the head secured by a cloth hair tie and blue elastic band. No scalp trauma is identified. The external auditory canals are patent and free of blood. The eyes are blue and the pupils equally dilated. The sclera is white. The nostrils are both patent and contain a small amount of tan mucous material. The teeth are native and in good repair. The tongue is smooth, pink-tan and granular. No buccal mucosal trauma is seen. The frenulum is intact. There is a slight drying artifact of the tip of the tongue. On the left cheek is a pattern of dried saliva and mucous material which does not appear to be hemorrhagic. The neck contains no palpable adenopathy or masses and the trachea and larynx are midline. The chest is symmetrical. Breasts are mid-pubescent. The abdomen is flat and contains no scars. No palpable organ omegaly or masses are identified. The external genitalia are unremarkable. Only small amounts of pubic hair are present. The anus is patent. Examination of the extremities is unremarkable. On the ring finger of the right hand is a yellow metal band with a small red colored stone. Around the right wrist is a yellow metal bracelet. A black ink line underlines a ten digit number “021-222-3412” on the palm of the right hand. The fingernails of both hands are painted red and are of sufficient length for clipping. Examination of the back is unremarkable. There is dorsal 2+ to 3+ livor mortis which is non-blanching. Livor mortis is also present on the left side of the face. At the time of the initiation of the autopsy there is mild 2 to 2+ rigor mortis of the elbows and shoulders with more advanced 3 to 4+ rigor mortis of the joints of the lower extremities.

INTERNAL EXAM

The anterior chest musculature is well developed. No sternal or rib fractures are identified.

Mediastinum: The mediastinal contents are normally distributed. The 29 gm thymus gland has a normal external appearance. The cut sections are finely lobular and pink-tan. No petechial hemorrhages are seen. The aorta and remainder of the mediastinal structures are unremarkable.

Body Cavities: The right and left thoracic cavities contain approximately 5 cc of straw colored fluid. The pleural surfaces are smooth and glistening. The pericardial sac contains 3-4 cc of straw

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colored fluid and the epicardium and pericardium are unremarkable. The abdominal contents are normally distributed and covered by a smooth glistening serosa. No intraabdominal accumulation of fluid or blood is seen.

Lungs: The 400 gm right lung and 365 gm left lung have a normal lobar configuration. An occasional scattered subpleural petechial hemorrhage is seen on the surface of each lung. The cut sections of the lungs disclose an intact alveolar architecture with a small amount of watery fluid exuding from the cut surfaces with mild pressure. The intrapulmonary bronchi and vasculature are unremarkable. No evidence of consolidation is seen.

Heart: The 200 gm heart has a normal external configuration. There are scattered subepicardial petechial hemorrhages over the anterior surface of the heart. The coronary arteries are normal in their distribution and contain no evidence of atherosclerosis. The tan-pink myocardium is homogeneous and contains no areas of fibrosisor infarction. The endocardium is unremarkable. The valve cusps are thin, delicate and pliable and contain no vegetation or thrombosis. The major vessels enter and leave the heart in the normal fashion. The foramen ovaleis closed.

Aorta and Vena Cava: The aorta is patent throughout its course as are its major branches. No atherosclerosis seen. The vena cava is unremarkable.

Spleen: The 120 gm spleen has a finely wrinkled purple capsule. Cut sections are homogeneous and disclose readily identifiable red and white pulp. No intrinsic abnormalities are identified.

Adrenals: The adrenal glands are of normal size and shape. A golden yellow cortex surmounts a thin brown-tan medullary area. No intrinsic abnormalities are identified.

Kidneys: The 60 gm right kidney and 59 gm left kidney have a normal external appearance. The surfaces are smooth and glistening. Cut sections disclose intact corticomedullary architecture. The renal papillae are sharply demarcated. The pelvicaliceal system is lined by gray-white mucosa which is unremarkable. Both uretersare patent throughout their course to the bladder.

Liver: The 780 gm liver has a normal external appearance. The capsule is smooth and glistening. Cut sections disclose an intact lobular architecture with no intrinsic abnormalities identified.

Pancreas: The pancreas is of normal size and shape. Cut sections are finely lobular and tan. No intrinsic abnormalities are identified.

Bladder: The bladder is contracted and contains no urine. The bladder mucosa is smooth and tan-gray. No intrinsic abnormalities are seen.

Genitalia: The upper portions of the vaginal vault contain no abnormalities. The uterus measures 5 X 2 X 1.5 cm and is unremarkable. The cervical contains no abnormalities. Both fallopian tubes and ovaries are unremarkable by gross examination.

Gallbladder: The gallbladder contains 2-3 cc of amber bile. No stones are identified and the mucosa is smooth and velvety. The cystic duct, right and left hepatic duct and common bile duct are patent throughout their course to the duodenum.

G.I. Tract: The esophagus is empty. It is lined by gray-white mucosa. The stomach contains a small amount (15-20 cc) of viscous to green to tan colored thick mucous material without
particulate matter identified. The gastric mucosa is autolyzed but contains no areas of hemorrhage or ulceration. The proximal portion of the small intestine contains fragmented pieces of yellow to light green-tan apparent vegetable or fruit material which may represent fragments of pineapple. No hemorrhage is identified. The remainder of the small intestine is unremarkable. The large intestine contains soft green fecal material. The appendix is absent.

**Lymphatic System:** Unremarkable

**Musculoskeletal System:** Unremarkable

**Skull and Brain:** Upon reflection of the scalp there is found to be an extensive area of scalp hemorrhage along the left temporoparietal area extending from the orbital ridge, posteriorly all the way to the occipital area. This encompasses an area measuring approximately 7 X 3 inches. This grossly appears to be a fresh hemorrhage with no evidence of organization. At the superior extension of this area of hemorrhage is a linear to comminuted skull fracture which extends from the right occipital to posteroparietal area forward to the right frontal area across the parietal portion of the skull. In the posteroparietal area of this fracture is a roughly rectangular shaped displaced fragment of skull measuring one and three-quarters by one-half inch. The hemorrhage and the fracture extend posteriorly just past the midline of the occipital area of the skull. This fracture measures approximately 8.5 inches in length. On removal of the skull cap there is found to be a thin film of subdural hemorrhage measuring approximately 8-10 cc over the surface of the left cerebral hemisphere and extending to the base of the cerebral hemisphere. The 2010 gm brain has a normal overall architecture. Mild narrowing of the sulci and flattening of the gyri are seen. No inflammation is identified. There is a thin film of subarachnoid hemorrhage overlying the entire left cerebral hemisphere. On the left cerebral hemisphere underlying the previously mentioned linear skull fracture is an extensive linear area of purple contusion extending from the left frontal area, posteriorly along the lateral aspect of the parietal region and into the occipital area. This area of contusion measures 10 inches in length with a width of up to 1.75 inches. At the tip of the left temporal lobe is a one-quarter by one-quarter inch similar appearing purple contusion. Only very minimal contusion is present at the tip of the right temporal lobe. This area of contusion measures only one-half inch in maximum dimension. The cerebral vasculature contains no evidence of atherosclerosis. Multiple coronal sections of the cerebral hemispheres, brain stem and cerebellum disclose no additional abnormalities. The areas of previously described contusion are characterized by purple linear streak-like discolorations of the gray matter perpendicular to the surface of the cerebral cortex. These extend approximately 5 mm into the cerebral cortex. Examination of the base of the brain discloses no additional fractures.

**Neck:** Dissection of the neck is performed after removal of the thoracoabdominal organs and the brain. The anterior strap musculature of the neck is serially dissected. Multiple sections of the sternocleidomastoid muscle disclose no hemorrhages. Sections of the remainder of the strap musculature of the neck disclose no evidence of hemorrhage. Examination of the thyroid cartilage, cricoid cartilage and hyoid bone disclose no evidence of fracture or hemorrhage. Multiple cross sections of the tongue disclose no hemorrhage or traumatic injury. The thyroid gland weighs 4 gm and is normal in appearance. Cut sections are finely lobular and red-tan. The trachea and larynx are lined by smooth pink-tan mucosa without intrinsic abnormalities.

**Myocardium:** Sections of the ventricular myocardium are composed of interlacing bundles of cardiac muscle fibers. No fibrosis or inflammation is identified.
**Lungs:** The alveolar architecture of the lungs is well preserved. Pulmonary vascular congestion is identified. No intrinsic abnormalities are seen.

**Spleen:** There is mild autolysis of the spleen. Both red-and-white pulp are identifiable.

**Thyroid:** The thyroid gland is composed of normal-appearing follicles. An occasional isolated area of chronic interstitial inflammatory infiltrate is seen. There is also a small fragment of parathyroid tissue.

**Thymus:** The thymus gland retains the usual architecture. The lymphoid material is intact and scattered Hassall's corpuscles are identified. Mild vascular congestion is identified.

**Trachea:** There is mild chronic inflammation in the sub mucosa of the trachea.

**Liver:** The lobular architecture of the liver is well preserved. No inflammation or intrinsic abnormality is identified.

**Pancreas:** There is autolysis of the pancreas which is otherwise unremarkable. Kidney: The overall architecture of the kidney is well preserved. There is perhaps mild vascular congestion in the cortex but no inflammation is identified.

**Bladder:** The transitional epithelium of the bladder is autolyzed. No significant intrinsic abnormalities are seen.

**Reproductive Organs:** Sections of the uterus are consistent with those of a teen-age female. The ovary is unremarkable.

**Adrenal:** The architecture of the adrenal is well preserved and no intrinsic abnormalities are seen.

**Brain:** Sections from the areas of contusion disclose disrupted blood vessels of the cortex with surrounding hemorrhage. There is no evidence of inflammatory infiltrate or organization of the hemorrhage. Subarachnoid hemorrhage is also identified. Cortical neurons are surrounded by clear halos, as are glial cells.

**Vaginal Mucosa:** All of the sections contain vascular congestion and focal interstitial chronic inflammation. The smallest piece of tissue, from the 6:00 position of the vaginal wall/hymen, contains epithelial erosion with underlying capillary congestion. A small number of red blood cells is present on the eroded surface, as is birefringent foreign material. Acute inflammatory infiltrate is not seen.

**EVIDENCE**

Items turned over to the State Police Department as evidence include: Fibers and hair from clothing and body surfaces; ligatures; clothing; vaginal swabs and smears; rectal swabs and smears; oral swabs and smears; paper bags from hands; fingernail clippings; jewelry; paper bags from feet; white body bag; samples of head hair, eyelashes and eyebrows; swabs from right and left thighs and right cheek; red top and purple top tubes of blood.

**END OF REPORT**