

QUEENSLAND HEALTH FORENSIC AND SCIENTIFIC SERVICES

AUTOPSY REPORT	AUTHORISATION Brisbane Coroner's Court	AUTOPSY No. SS12J571
	ACT / FORM Coroners Act 2003 Form 8	CCMS NUMBER 2012/1492 ✓
DATE & PLACE OF DEATH 19-Apr-12 - 30-Apr-12 Unknown	GIVEN NAME/S Allison	SURNAME BADEN-CLAY
TIME, DATE AND PLACE OF AUTOPSY 09:30 01-May-12 John Tonge Centre QHSS	SEX, AGE, DOB Female, 43 years, (01-Jul-1968)	

ORDERS MADE BY CORONER

Form 2 Order for Autopsy and Autopsy Testing (Queensland Coroners Act 2003).

COPY**TYPE OF EXAMINATION REQUIRED**

External and full internal examination (ordered and performed 01/05/2012).

TESTS ORDERED BY CORONER

CT scan.
Toxicology.

'DEATH' SCENE

Note: The 'death scene' may not have been the actual place of death. This term is used to refer to the scene where the body was found.

DEATH SCENE ATTENDANCE

I was contacted in relation to attending the death scene at approximately 1400hrs on 30/04/2012, by A/Insp Ewen Taylor, Metro North Region RFSC. He advised that the body of a woman had been found, and was believed to be Allison Baden-Clay who had been the subject of a missing person investigation for 11 days. The body had been found on the bank of Kholo Creek near the Brisbane River, and there were concerns that the rising tide may affect the body.

I arrived at the scene at 1510hrs with Dr Phil Storey (Forensic Pathologist) and Dr Nadine Forde (Senior Forensic Pathology Registrar). The address was Mt Crosby Road, Anstead.

I was met by A/Insp Taylor and numerous other officers from Homicide, Indooroopilly CIB, Scientific Section and Indooroopilly Scenes of Crime. Officers from the Queensland Fire and Rescue Service (QFRS) were also present. Further information provided to me was that the body had been found by a canoeist earlier in the day. It was described as being partly face down and partly on its right side.

I was led to a bridge over Kholo Creek, which I was informed was approximately 14m above the water. It was difficult to observe the body, because it was under the bridge. By cautiously leaning partly over the edge of the bridge I could see the head and upper torso of the body.

Access to the body was difficult, and two police officers were winched down with the assistance of the QFRS. I did not go down to the body. Police officers undertook some sampling while I waited on the bridge. The body was in thick mud, which appeared difficult to walk in. The two police officers, with the assistance of a QFRS officer, rolled the body onto a tarpaulin, placed it on a stretcher and winched it up onto the bridge at approximately 1655hrs. As far as I could determine, the extrication of the body appeared to have been conducted very carefully, and without significantly affecting the position of the limbs or clothing.

I examined the body on the bridge, under a marquee, with lighting provided by the QPS. The body was of a female who appeared Caucasian. The body was clothed in what appeared to be a jacket which was up around her head and neck region. Her hands were entangled within this garment. As this garment could potentially have been a ligature, I did not remove it from the

- 7 SEP 2012

BRISBANE

AUTOPSY No. SS12J571

neck or remove the hands from the garment. The body was also clothed in a singlet with included bra, 3/4 length pants and sneakers.

There were post-mortem changes which consisted of a combination of putrefaction and mummification. There were numerous insect larvae and a small number of other insects such as beetles. There was significant larval activity associated with soft tissue loss involving much of the head and face, the distal forearms and part of the anterior left lower leg. Part of the skull was exposed.

I advised that the decomposition changes were consistent with death 11 days previously. I could not offer an opinion as to the cause of death, but advised that a CT scan would be performed when the body was taken to the mortuary.

I advised police officers and an undertaker that the body should be moved in the position it was currently laying in.

I left the scene at approximately 1800hrs.

The body was lodged in the mortuary at Queensland Health Forensic and Scientific Services at 1908hrs.

A full body CT scan was performed at approximately 2000hrs. My preliminary review of the CT scan showed no obvious fractures, including to the hyoid bone, no obvious cause of death and a ring on the left hand. At 2040hrs I advised Detective Mal Gundry of Indooroopilly CIB of these findings.

DEATH SCENE IMAGES

I also received images of the death scene from Police. These show that the body had been lying on the right side. Both arms were positioned up near the head. The left leg was positioned forwards and the right leg was positioned backwards.

The embankment on which the body was found was sloped. There were numerous flies and insect larvae on the body. After the body was removed, a depression corresponding to the contour of the body was evident in the underlying mud.

OBSERVERS PRESENT

D Sgt Rhys Breust, Homicide.
 D S/C Cameron McLeod, Indooroopilly CIB.
 PCSC Cameron Symmons, Indooroopilly CIB.
 A/Insp Ewen Taylor, Metro North Region, RFSC.
 Sgt Nicole Tysoe, Scientific Section.
 S/C Kylie Tracey, Indooroopilly SOC.
 Con Jackie Lucas, Coronial Support Unit, John Tonge Centre.

EXTERNAL EXAMINATION

Identifying features

There is significant decomposition involving the head, and the body is not recognisable for the purposes of visual identification. A Queensland Police Service morgue tag is attached to the body bag. At the commencement of the post-mortem examination identification had not been confirmed and the name on the tag at this time (Unknown Unknown) matches the name on the Police Form 1. There are matching QPS barcodes on the morgue tag, attached to the body bag, around the right ankle and on the Police Form 1.

There is a probable transversely orientated linear scar (120mm) in the suprapubic region.

There are no obvious tattoos.

Clothing / Jewellery / Other material

The body is received in a sealed body bag. The seal is broken to commence the post-mortem examination. The body is wrapped in a blue tarpaulin.

There is plant material on the body, in the hair and with the body. Some of this is sampled and taken possession of by the attending police scientific officer. There is also dirt/mud on and with the body.

JEWELLERY

There are two rings on the left 4th finger. The proximal ring is a gold band engraved with 'G&A 23:8:97'. The distal ring consists of a gold band with a setting containing a clear jewel. The jewel measures 8mm in diameter and the setting measures 10mm in diameter.

The two rings were taken by the attending detectives.

CLOTHING

The body is clothed in the following:

- What appeared to be a jacket at the death scene is a light coloured jumper. Most of the jumper is inside-out, and the hands remain within the sleeves. It is somewhat twisted and wrapped around the neck to some degree. Both the collar and waistband regions of the jumper are in the neck region. The jumper is of Bonds brand and size XL. The unusual position of the jumper may have occurred after death with movement of the body. It cannot be excluded that it was used as a ligature.
- Purple single with incorporated bra. It has thin straps over the shoulders. It is of Short Stories brand and size 12.
- Dark coloured three-quarter length pants. They are of Katies brand and size XXL. There are no pockets.
- Light coloured underpants.
- Predominantly white sneakers with some blue areas. They are of Lynx brand and size 9. They have some mud and dirt on them. On initial examination the laces of both shoes are tied up, but upon removal of the shoes the left shoelace came partially undone.
- Short white socks with a darker band at the top.

All of the clothing was taken by the attending scientific officer.

OTHER MATERIAL

As the previously described jumper was being examined a fingertip of a cream coloured rubber glove fell out. It is not clear whether this was present within the jumper, or may represent some contamination at the scene. It was not present as a result of contamination within the mortuary.

There is pink polish on the fingernails, which is worn and absent in areas.

AUTOPSY No. SS12J571

Physical characteristics

Height 170cm, weight 72kg.

The body is that of a Caucasian appearing adult female.

The head hair is long and brown. It detached from the head with movement of the body.

The pubic hair appears light brown and also easily detaches with minimal contact.

Most of the soft tissues of the face are severely affected by decomposition. The eyes, ears, nose, lips and tongue can therefore not be assessed.

The facial skeleton is partially exposed and there is no evidence of fracture. The nasal bone shows no evidence of fracture. The dentition consists of natural upper and lower teeth. The mouth contains a large number of fly larvae.

The breasts are unremarkable.

The external genitalia show post-mortem changes, but no injuries. Speculum examination of the vagina and cervix shows post-mortem changes including gaseous expansion of soft tissues and the presence of blood stained fluid, however there are no injuries.

The anus shows post-mortem changes including gaseous expansion of soft tissues, but there are no injuries.

There are no congenital or acquired deformities.

Signs of post-mortem change

Rigor mortis is absent.

The distribution of post-mortem hypostasis is difficult to determine. It appears to be distributed over the right lateral and right anterolateral surfaces of the body, as this is the distribution of most of the putrefactive changes.

There are most putrefactive changes including green and red discolouration of the skin and areas of skin slippage. The latter involve parts of the superior and posterior scalp, posterior neck, anterior right trunk, left lateral back, right lateral back, part of the anterior and posterior left forearm, much of the anterior and posterior right upper arm, part of the right buttock, and much of the anterior right thigh. *This distribution of putrefactive changes generally corresponds to the dependant regions of the body in the position in which it had been found. This is suggestive of the body coming to be in the position in which it was found within a relatively short period of time after death.*

There is also general gaseous distension of soft tissues and the abdominal cavity.

There is yellow decomposition fluid in the body bag.

There is yellow mummification of the skin which is generally in the left lateral and left anterior aspect. However it also involves the posterior left lower limb and medial right lower limb. More specifically, it involves the left chest, left abdomen, upper back, left back and buttock, medial right thigh, anterior right lower leg, posterior right lower leg and posterior left thigh and lower leg. *This distribution of mummification generally corresponds to the non-dependant and more exposed regions of the body in the position in which it had been found. This is suggestive of the body coming to be in the position in which it was found within a relatively short period of time after death.*

Post-mortem changes are minimal on the lower back, buttocks and posterior right thigh.

There are numerous insect larvae on the body, with the body and within the soft tissues of the body. These are of variable size. There are also other insects including beetles on and with the body. There are patchy areas of insect eggs.

There are areas of soft tissue loss, and in these areas putrefactive changes are greatest. This soft tissue loss is consistent with insect larval activity, and there may also have been post-mortem predation by marine or other animals. No bite/teeth marks are evident at the margins. These areas involve much of the face, and much of the facial skeleton is exposed. The changes also involve the anterior neck, the central upper chest, the intermammary region, the left anterior shoulder and upper arm, the distal anterior left forearm, part of the dorsal left hand, the anterior right shoulder and upper arm, much of the anterior and posterior right forearm and hand, and smaller areas on the suprapubic region, anterior left thigh and both ankles/feet. There is also a large defect (150mm x 135mm) over the central anterior left lower leg with exposure of the tibia.

The palm and fingerprints of the left hand are intact, however, most of the skin of the right hand is absent, and there is exposure of some of the phalanges.

The facial soft tissues including parts of the eyes, nose and ears are significantly affected by putrefactive changes.

As previously described the head and pubic hair are easily detached.

All of the fingernails of the right hand are detached, however, only four are identified within the sleeve of the jumper. On the left hand the nails of fingers 1 and 5 are detached, while those of 2 - 4 are loosely attached. All of the identified nails from both hands, including those attached to the fingers, were submitted for DNA testing as required.

Signs of recent therapy

Nil.

Signs of recent injury

No definite injuries are identified. However, interpretation is significantly limited by changes of decomposition. In the previously described areas where there is significant soft tissue loss, particularly the facial region, forearms and left lower leg, such insect larval activity raises the possibility of pre-existing injuries at these sites. However, post-mortem changes prevent this assessment.

There are no injuries typical of what is seen when a body is being washed around in moving water.

INTERNAL EXAMINATION

The internal organs and soft tissues show significant putrefactive changes which limit interpretation.

Head

Reflection of the scalp shows no evidence of haemorrhage.

The skull shows no evidence of fracture of the vault, base or face.

The dura is intact and there is no extradural haemorrhage.

AUTOPSY No. SS12J571

The brain is extremely soft but is able to be removed within the dura. It is not weighed. It is retained for specialist neuropathology examination (see report below).

The pituitary gland is identified.

The tongue is severely affected by decomposition, but some residual tongue tissue is identified. The pharynx showed marked decomposition of the soft tissues.

Neck & thoracic cavity

NECK

There is significant decomposition involving the soft tissues of the neck.

The strap muscles of the neck show significant decomposition, but no injury can be identified.

The carotid arteries are intact and show mild streaky atheroma.

The cervical lymph nodes are not identifiable. The thyroid gland is not identifiable.

The hyoid bone is identified. It shows no evidence of fracture or adjacent haemorrhage. The larynx is intact and there is no evidence of fracture or haemorrhage.

The cervical spinal column shows no evidence of injury.

THORACIC CAVITY

The clavicles show no evidence of injury.

The thoracic spinal column shows no evidence of injury.

There is pectus excavatum deformity of the chest.

The sternum shows no evidence of injury. The ribs show no evidence of fracture, however there is an area of apparent haemorrhage overlying the anterior left 4th to 6th ribs on the interior aspect. Dissection of the soft tissues in this area shows apparent haemorrhage. No fracture can be identified to the ribs. The parietal pleura is removed bilaterally.

The trachea and major bronchi show no evidence of aspiration

The lungs (lef: 195g, right 335g) are not hyperinflated. There is no obvious black pigment on their pleural surfaces. There are no adhesions of the lungs to the chest wall. On section there is no increased fluid. There are small collections of purge fluid within the pleural cavities. The appearance of the lungs is not typical of drowning; however post-mortem changes significantly limit interpretation.

The diaphragm is unremarkable.

The pericardium is unremarkable and there is abnormal collection of fluid within the pericardial sac.

The heart (210g) appears of normal size. The atrial and ventricular chambers are of normal size.

The epicardial surface is unremarkable. The endocardial surface is unremarkable. The foramen ovale is not patent. The valves are unremarkable.

AUTOPSY No. SS12J571

The myocardium shows no evidence of fibrosis or infarction. The left ventricle, interventricular septum and right ventricle measure 11mm, 11mm and 2mm in thickness respectively.

The coronary arteries show no atheromatous stenosis and no thrombosis.

The aorta shows mild streaky atheroma. The pulmonary arteries show no atheroma or thromboembolism. The superior vena cava and inferior vena cava are unremarkable.

The mediastinum is unremarkable.

The oesophagus is unremarkable.

The breasts are unremarkable on internal palpation.

Abdominal & pelvic cavity

The peritoneum is unremarkable and the peritoneal cavity contains no fluid.

The stomach contains a small amount of pink fluid in which there is pale granular material. The nature of this material is uncertain, but appears more likely to represent food material than tablet residue. The mucosa shows no evidence of ulceration or haemorrhage.

The duodenal mucosa is unremarkable.

The small bowel, large bowel and mesentery are externally unremarkable. The small and large bowel are intermittently opened and no blood is identified within their lumina.

The appendix is identified, and there is fibrotic stricture of the proximal two thirds.

The liver (1200g) has unremarkable capsular and cut surfaces. A small amount of blood is obtained from the vasculature of the liver. The gall bladder is unremarkable and contains no bile. The pancreas is unremarkable.

The spleen (95g) has unremarkable capsular and cut surfaces. The lymph nodes that can be identified appear unremarkable.

The adrenal glands are unremarkable.

The kidneys (left 120g, right 110g) have unremarkable capsular, subcapsular and cut surfaces. The collecting systems and ureters are unremarkable.

The bladder is unremarkable and contains no urine.

The vagina is unremarkable. The uterus is bulky, but otherwise unremarkable. There is no evidence of pregnancy.

The retroperitoneum is unremarkable.

The aorta shows mild streaky atheroma. The origins of its major branches are patent. The other major arteries show no evidence of significant atheroma. The inferior vena cava is unremarkable.

The lumbosacral spinal column and the pelvis show no evidence of injury.

Extremities

The left thigh is incised to obtain samples for testing.

AUTOPSY No. SS12J571

INVESTIGATIONS PERFORMEDRadiology

CT scan from the head to the feet.

Histology

Small tissue samples from selected organs. No wet tissue is kept.

Neuropathology

The brain is retained.

Odontology

For dental identification and examination for injuries.

Toxicology

Blood from liver vessels (1), stomach contents (1), liver (2) and hair (1) for full testing.

Forensic biology

Samples taken: FTA card; psoas and thigh muscle; femoral bone; bilateral fingernails; hair; swabs and smears (oral, vulval, low vaginal, high vaginal, anal). In addition, swabs of the rings were made and taken by the attending scientific officer.

Diatom testing

Samples of liver, left femur and mortuary tap water were taken. These samples were later collected by QPS and sent with water samples for expert analysis.

RESULTS**Radiology**Post Mortem CT ExaminationTechnique

Unenhanced acquisition through the body. Images reconstructed at 2mm intervals through the body and 1mm intervals through the head and C-spine. Study reviewed on the Vitrea workstation.

Findings

There is no cranial vault or skull base fracture. Changes consistent with decomposition are present diffusely throughout the brain with extensive intra-cranial gas. No good evidence of intra-cranial haemorrhage is appreciated. There is extensive soft tissue loss overlying the face. No facial fracture. The mandible is intact.

The hyoid and thyroid laminae appear intact on these images. There is no C spine fracture.

There are diffuse changes consistent with decomposition throughout the soft tissues with areas of soft tissue loss evident overlying the right forearm, left wrist and left leg. Metallic

foreign body consistent with a ring is noted at the left 4th finger. High attenuation foreign material is present superficially overlying the upper body and face.

Changes consistent with decomposition are present throughout the thoracic and abdominal viscera. No convincing foreign bodies are seen within the airway or digestive tract. A few phleboliths are noted within the pelvis.

The imaged axial and appendicular skeleton are intact. There is no evidence of acute fracture.

Comment

Assessment is limited by decomposition changes.

There is no good CT evidence of traumatic intra-cranial, intra-thoracic or Intra-abdominal injury. The axial and appendicular skeleton appears intact with no evidence of acute fracture.

Reported by:

Dr Aidan M Callinan, MBBS FRANZCR
Consultant Radiologist
03/05/2012

Histology

All of the sections show marked autolysis and putrefaction which significantly limits interpretation.

Left anterior chest wall (site of possible haemorrhage): The section consists of fibrofatty connective tissue and skeletal muscle. No definite haemorrhage is identified. There is no inflammatory reaction.

Lungs: Sections of each lobe are examined. No pathological features are identified.

Heart: Sections of both ventricles and the interventricular septum are examined. No pathological features are identified.

Liver: No pathological features are identified.

Spleen: No pathological features are identified.

Kidney: No pathological features are identified.

Neuropathology

Macroscopic Report by Dr K Urankar
Date: 21/05/2012

Brain Macro: Weight of whole fixed brain 1098 grams + 102 grams of fragments of autolysed brain.

External Appearance

Convexities

The brain is received encased in dura and comprises a markedly autolysed brain which appears

AUTOPSY No. SS12J571

fragmented. The dura is complete over the cerebral convexities. There is no evidence of extradural haemorrhage. Undemeath the left cerebral convexity there is a modest amount of granular brown material within which there are scattered insect casings. This material is not present beneath the right sided dura and may possibly represent subdural haemorrhage which has undergone autolysis. It may also represent post mortem debris. The underlying left hemisphere shows marked autolysis. The right cerebral hemisphere shows similar marked autolysis but retains a pale colouration.

Base of Brain

The basal leptomeninges are markedly disrupted as a result of marked autolytic changes with autolytic disruption of basal brain structures. The circle of Willis cannot be assessed.

Brain Sections

The autolysed brain is sectioned in the coronal plane however a detailed assessment of the structures cannot be performed. The superior cortex and white matter shows no focal abnormalities. Structures more basally located are markedly disrupted. There are no obvious areas of haemorrhage within the white matter. Deep grey matter structures cannot be assessed and the medial temporal lobe structures are not identified.

Brainstem

This is not identified.

Cerebellum

This is not identified.

Sections taken.

Brain Micro

Brain: Sections comprise autolytic debris, bacteria and insect casings. No overt haemorrhage, lysed red blood cells or haemosiderin-laden macrophages are identified. The underlying cerebral tissue shows marked autolysis. The dura is unremarkable.

SUMMARY:

1. Autolysed cerebral tissue.

COMMENT: Given the degree of autolysis the presence or absence of subdural haemorrhage or other indicators of traumatic injury cannot be confirmed.

Reported by: Dr K Urankar.
Date: 30/05/2012.

Odontology

Forensic Odontology Summary and Conclusion by Alex Forrest

Dental records and two bitewing dental radiographs were supplied for Allison BADEN-CLAY, DOB 01-07-1968, of 593 Brookfield Road, Brookfield, Queensland 4069, and I was requested on 01-05-2012 to compare these records with the remains of the deceased, PM number 488673894. Radiographic comparison establishes the identity of 488673894 as being BADEN-CLAY. Examination of the teeth and jaws of the deceased demonstrates no obvious signs of trauma apart from a small mesio-incisal chip on tooth 33, which may or may not be of recent origin.

AUTOPSY No. SS12J571

It is therefore my opinion that the identity of the unknown deceased person, 488673894, that I examined at the mortuary at Queensland Health Scientific Services at 39 Kessels Road, Coopers Plains on Tuesday May 01, 2012, at approximately 1200 hours, and again on Thursday 03 May 2012 at approximately 1700 hours, at that time in the company of WU, were those of Allison BADEN-CLAY, DOB 01-07-1968, of 593 Brookfield Road, Brookfield, Queensland 4069.

Forensic Odontology Peer Review by Henry Wu

The procedures used and conclusions reached in this identification have been Peer-Reviewed by Dr Henry WU, BDS (Qld), Grad Dip For Odont (WA)

Toxicology - Government Analyst's Report (12TF778)

Please see the attached certificate.

Diatom testing

Please see the attached report from Dr Jacob John.

SUMMARY & INTERPRETATION

History

The history is obtained from:

- Police Form 1.
- General practice medical notes from Kenmore Clinics, Kenmore.
- Obstetric medical notes from Dr David Lingard.

PAST MEDICAL HISTORY

The deceased was a 43 year old woman whose past medical history included:

- Asthma, for which she was prescribed Ventolin (salbutamol) and Seretide (fluticasone and salmeterol) inhalers. This does not appear to have been of a severe degree; however there had been exacerbations by upper respiratory tract infections.

- Depression, for which she was prescribed Zoloft (sertraline). This had been a long term condition, being present after the birth of her first child in 2001. In 2003 a psychiatrist diagnosed a moderately severe recurrence of a major depressive illness. There was also an associated panic disorder. Around this time she had also been prone to transient suicidal thoughts, however there is no further mention of suicidal ideation or suicide attempts. She had been taking sertraline intermittently for several years, and appears to have recommenced treatment in May 2011 due to increased home, relationship and financial stressors. There had been relationship difficulties for a few years, and there had been further relationship issues in October 2011.

- High blood pressure (hypertension) and diabetes, both associated with pregnancy.
- Right breast cyst noted on breast screening.
- Abnormal placental growth (partial hydatidiform mole) in about 2002.
- Delivering three children including a Caesarean section (2006).

AUTOPSY No. SS12J571

- Probable low thyroid function (hypothyroidism) as a child.
- Not smoking.

RECENT EVENTS

I was advised that she was last seen alive on approximately 19/04/2012. She had also been the subject of an extensive missing person search.

On 30/04/2012 she was found by a canoeist underneath a bridge at Kholo Creek near the Brisbane River. She was clothed and showed signs of decomposition.

I attended the death scene on the afternoon of 30/04/2012. I partially observed the body from the bridge which I was advised was 14 metres high. The body had been lying on the right side, and was brought up from the creek bank to the bridge where I conducted a preliminary examination. She was clothed and showed signs of decomposition, but I could not offer a cause of death.

Findings

CT SCANS showed decomposition, but no injuries or other findings to account for death.

EXTERNAL POST-MORTEM EXAMINATION showed widespread changes of decomposition. This distribution of these changes generally corresponded to the dependant regions of the body in the position in which the body had been found. This is suggestive of the body coming to be in the position in which it was found within a relatively short period of time after death.

On most of the body the skin was present, however, there were areas associated with significant maggot activity and soft tissue loss. This may also have been due to post-mortem predation by marine or other animals. These areas of tissue loss predominantly involved the face and parts of the forearms. There was also a big defect on the left shin. In these areas of maggot activity, there may have been a pre-existing injury, however due to post-mortem changes this could not be confirmed.

No definite injuries were identified. The body was clothed, including a jumper which was somewhat twisted around the head and neck region. It could not be excluded that the jumper has been used as a ligature, however it was considered that it could have become in that position after death.

There are no injuries typical of what is seen when a body is being washed around in moving water.

There were no injuries to suggest sexual assault.

INTERNAL POST-MORTEM EXAMINATION was also limited by decomposition. The only evidence of injury was an apparent bruise on the left inner chest wall. This was not associated with any fractures. There was no significant natural disease.

HISTOLOGY was significantly limited by decomposition. The bruise on the left inner chest wall was not confirmed; however this does not exclude it as being an area of real haemorrhage. No abnormalities were detected in the sampled organs.

NEUROPATHOLOGY examination of the brain was also significantly limited by decomposition. On naked eye examination there was some granular brown material between the left side of the brain and the dura. The appearance raised the possibility of subdural haemorrhage, however due to the effects of decomposition this could not be confirmed on naked eye or microscopic examination. It remains a possibility that there was a subdural haemorrhage.

AUTOPSY No. SS12J571

ODONTOLOGY confirmed identification. There was a small chip on one tooth; however it could not be determined if or not this was recent.

TOXICOLOGY testing was performed on blood obtained from the liver blood vessels, liver tissue and stomach contents. Interpretation of the toxicology results is also significantly limited by decomposition.

Testing of blood showed an alcohol concentration of 95mg/100mL, which is equivalent to 0.095%. Alcohol is produced in the body after death as part of the decomposition process. Therefore some or all of this alcohol could be the result of decomposition, and not consumption prior to death.

The antidepressant sertraline and its metabolite desmethyl sertraline (also known as norsesertaline) were detected in all three specimens. Desmethyl sertraline has approximately 10-20% activity of Sertraline. [Baselt] In overdose sertraline may cause vomiting, lethargy, difficulty walking, seizures, a rapid heart rate and death.

The levels in the post-mortem blood were:

- Sertraline 0.59mg/kg.
- Desmethyl sertraline 3.3mg/kg.

Interpretation of these levels is very difficult for the following reasons:

- The significant degree of decomposition may have altered the level of the drug in the blood.
- The only blood available was from the liver. The ideal specimen is from the blood vessels in the legs.
- Sertraline may undergo post-mortem redistribution, meaning that blood samples from different parts of the body may give significantly different results. [Baselt; Han et al]

A search of the medical literature regarding sertraline levels in the blood revealed:

- The upper limit of the therapeutic range is about 0.21-0.3mg/kg. [Goeringer et al; Molina]
- The lowest reported blood level of sertraline in a case of fatal drug overdose is 0.61mg/kg. The desmethyl sertraline level was 1.55mg/kg. However, it is noted that there was also a non-toxic level of diphenhydramine (antihistamine) in the blood in this case. [Logan et al]
- In another reported case of fatal sertraline toxicity the blood level of sertraline was 1.0mg/kg and the desmethyl sertraline level was 0.2mg/kg. In this case there was also a therapeutic level of alprazolam (anti-anxiety drug) in the blood. [Milner et al]
- Another study concluded that the minimum blood level causing death (in the absence of other risk factors) was 1.5mg/kg. It also noted that with therapeutic levels of sertraline, the desmethyl sertraline levels were generally greater than the sertraline levels, while with raised sertraline levels, the opposite was generally true. [Goeringer et al]

The levels in the post-mortem liver were:

- Sertraline 5mg/kg.
- Desmethyl sertraline 31mg/kg.

In the case reported by Milner et al the sertraline level was 17mg/kg and the desmethyl sertraline level was 0.4mg/kg

The levels in the post-mortem stomach contents were:

AUTOPSY No. SS12J571

- Sertraline 2.2mg/kg.
- Desmethyl sertraline 6.3mg/kg.

For all three samples, no other drugs were detected.

In summary, there is insufficient evidence, in the context of decomposition, to attribute the cause of death to alcohol and/or sertraline toxicity. However, this cannot be excluded.

DIATOM TESTING showed no evidence of drowning; however this does not exclude drowning as a possible cause of death.

Conclusion

The opinion as to the cause of death is based on the Police and medical history, and a full post-mortem examination including associated testing. In my opinion, the CAUSE OF DEATH cannot be determined and is therefore certified as 'undetermined'.

The degree of decomposition was significant and this limited interpretation of all facets of the post-mortem examination. It is most likely that the effects of decomposition destroyed or concealed evidence of the cause of death.

The circumstances are certainly in favour of an unnatural cause of death over a natural cause of death. Her past medical history included asthma. This can be a fatal disease; however it does not appear to have been very severe in her case and therefore is not considered to be a possible cause of death. Post-mortem examination did not reveal any findings to indicate any other significant pre-existing natural disease.

Drowning has to be considered a possible cause of death given that her body was found near a creek. The post-mortem diagnosis of drowning can be a difficult determination, even in bodies without decomposition. In some cases there is minimal positive evidence to attribute death to drowning. It would be very difficult to find signs of drowning in this case due to the degree of decomposition.

As the body was found below a bridge reported to be 14m high, injuries from a fall from a height need to be considered as a possible cause of death. As she was found directly underneath the bridge there would have to have been some movement of the body after impact with the ground or water. This possibly could have been by herself, by another person or by the tide.

With a fall from such a height I would expect injuries to have been identified at post-mortem examination if the fall was onto the ground. However, if the fall was onto water the degree of injury could be less. If there had been a fall into water, this could have predisposed her to drowning.

No definite injuries were detected at post-mortem examination, however there were possible injuries:

1. Subdural haemorrhage. If this was a true injury it indicates a blunt force impact to the head, probably of a moderate degree of force. Subdural haemorrhage can occur without a skull fracture. If death was the result of a subdural haemorrhage, it could have taken hours to occur after the time of impact. Impaired consciousness from a subdural haemorrhage could also predispose to drowning. There is no evidence to suggest she had a bleeding tendency.
2. Chipped tooth. This may or may not have been recent. If this was the result of a recent injury it indicates an impact to the mouth region, probably of a mild or moderate degree of force.

AUTOPSY No. SS12J571

3. Bruising on the interior left chest wall. If this was a true injury it indicates an impact to the chest region, probably of a mild degree of force.

It cannot be excluded that the three possible injuries above could have resulted from a fall from a height.

The possible injuries could also have been the result of blunt force from an assault.

Other possible causes of death from inflicted means are smothering and strangulation. Both of these methods may leave only minimal soft tissue injuries to the face and neck. As there were marked changes of decomposition involving these areas, smothering and strangulation are possible causes of death. The larynx and hyoid bone in the neck were not injured; however strangulation does not always cause injuries to these structures, for example when a soft broad ligature is used. Such a ligature includes clothing, and it is therefore possible that she had been strangled with the jumper she was wearing. As previously noted, the jumper may have come to be located up around her neck region by other means.

In addition, soft tissue injuries could have been destroyed or obscured by post-mortem changes. Maggots are generally attracted to moist areas of the body, such as natural body cavities and areas of injury (ante-mortem and post-mortem). Therefore, there could have been ante-mortem injuries at any of the sites of soft tissue loss described under 'Signs of post-mortem change' earlier in this report. With regard to cause of death, the most significant regions of the body would be the head and neck.

The difficulties of toxicology interpretation have been previously discussed. Death from drug toxicity (sertraline with or without the contribution of alcohol), cannot be excluded as a cause of death. Similar to a subdural haemorrhage, the process of death with drug toxicity can take some time and could predispose to drowning.

Death could also have resulted from the combined effects of the possibilities mentioned above.

The TIME OF DEATH cannot be determined. She was found about 11 days after last being seen. The degree of decomposition was such that death most likely occurred within a few days of her last being seen alive.

The PLACE OF DEATH cannot be determined. Death could have occurred at the site where the body was found. The body could also have been moved there after death by tidal movement of the creek or by another person.

AUTOPSY No. SS12J571

CAUSE OF DEATH

1(a). Undetermined

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