# FORENSIC MEDICINE

AND

# TOXICOLOGY.

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LONDON:
CHARLES GRIFFIN & COMPANY, LIMITED,
EXETER STREET, STRAND.

1893.

CHAPTER IV

## EXAMINATION OF THE DEAD BODY

**Post-mortem Examinations for Medico-legal Purposes -** There are several important points to be observed when making a medico-legal necropsy over and above the requirements of ordinary pathological investigations.

**External Inspection -** The examination should be made in daylight; colour changes are often invisible by artificial light. If the body is seen on the spot where it was first discovered, attention should be paid to the following points:- The exact posture in which it lies, the expression and colour of the face, the position of the hands whether clenched or not; if clenched, they should be examined for any substance possibly grasped by them. The fingers should be examined for cuts or wounds. The condition of the dress: if disordered, indicating a struggle, or if it is soiled or stained with blood. Attention should be directed to the ground on which the body lies and to that immediately around it for signs of struggling and for objects that may have dropped, as fragments of clothing, &c. Any discovery should at once be recorded in writing. The presence or absence of body heat, of cadaveric rigidity, or of putrefactive changes are to be observed. When an exhaustive investigation of the body *in situ* has been made, it may be removed to some place convenient for further examination.

The clothes are now to be removed and any cuts or injuries sustained by the clothing carefully compared with the underlying surface of the body. Marks resembling bruises should be sponged so as to make sure that they are not due to dirt or other external stain. Indications for identification are to be sought for in surface marks:- naevi, moles, tattoo-marks, cicatrices; external abnormalities or loss of fingers or limbs; absence of natural, or presence of artificial, teeth; colour of the hair; height, weight, sex, age, state of nutrition, and indications of social position, or of occupation. In women and female children the presence or absence of the hymen, any signs of recent violence to the genital organs, together with the presence of foreign substances in any of the natural apertures of the body should be ascertained.

If there are wounds, examine them carefully as to their length and depth and the structures divided or injured - whether they could have been self inflicted, and the kind of weapon that could have produced them. Examine the neck for marks of strangulation. If there is a gunshot wound, look for blackening or tattooing of the surrounding skin, and also for blackening of the hand.

The **internal** inspection must be complete; all the cavities of the body should be opened, even though sufficient cause for death is found in the cavity first opened. If this is not done, the counsel for the defence may assume the presence of disease in an important organ which has not been investigated, or it may be necessary to have a second examination made to clear up a doubtful point which ought to have been settled by the first examination. The cavity supposed to be implicated in the cause of death should be opened first. In cases where there is no reason for selecting one cavity before another, the order from above downwards may be followed. If there are any penetrating wounds produced by cutting instruments or by firearms, ascertain their direction, and, in case they are not self-inflicted, try to form an opinion as to the relative position of the deceased and his assailant. When bones, cartilages, or intervertebral substances

are injured, it is well to remove the injured parts and preserve them as evidence. Look carefully for any acute or chronic morbid changes in the organs, especially in cases of suspected poisoning, or when there is no gross traumatic lesion which would account for death. When the head has been injured the use of the chisel and hammer to open the cranium is to be avoided for fear of producing a fracture of the skull**,** or of causing one already existing to spread: the saw only should be used. The vagina and the uterus are to be examined for signs of recent delivery and for mechanical injuries, or for injuries produced by the introduction per vaginam of caustic or irritant substances. The vertebral canal should be opened and the condition of the cord ascertained.

**Cases of suspected poisoning.** - Several large glass jars, preferably new, but in any case thoroughly cleansed, should be provided. If they are furnished with glass stoppers so much the better, if not, some bladder or gutta-percha tissue should be obtained which may be secured by string over the mouths of the jars. It is convenient to have a large dish - a photographer's square porcelain dish is the best - for placing the stomach in when opening it.

Before opening the body, examine the mouth and lips for injuries caused by a corrosive, and ascertain if there is any peculiar odour given off from the mouth. After making the primary incision through the abdominal parietes, again try if any special odour can be distinguished, and if so obtain corroboratory evidence from those who are present; the same proceeding should be adopted when the stomach and intestines are opened. When the abdominal cavity is opened, look for signs of inflammation of the peritoneum or of any of the viscera, especially of the peritoneal aspect of the stomach. Then place a ligature round the lower end of the oesophagus, and a double one at the commencement of the duodenum. Divide the oesophagus above its ligature, and the duodenum between the two, and remove the stomach. On a dish, as already described, open the stomach along the lesser curvature, taking care that none of the contents are lost. The contents may be poured into one of the jars, and the inner coat of the stomach examined forthwith, its colour when first opened being noted. Search should be made with the aid of a lens for crystals, fragments of leaves, berries, and other parts of plants, and for particles of pigments, (such as indigo) which are mixed with certain poisons - as arsenic when sold in small quantities, and strychnine in the form of vermin-killer. Any suspicious substances found should be carefully collected and examined under the microscope. The intestines, large and small, separately ligatured, are to be removed and treated in the same way. In the case of corrosive and irritant poisons, the oesophagus should also be removed, opened, and its internal appearance noted, the effects of the poison being traced from the mouth down the digestive tract as far as any can be observed. The presence or absence of solid motions in the lower bowel is to be recorded.

The colour of the blood, its condition as regards fluidity, and the colour of the solid organs generally, should be observed. Indications of fatty degeneration in liver, kidneys, and heart, of injection, especially of the kidneys, and of ecchymoses must be looked for. In addition to the stomach and intestines with their contents, the liver, kidneys, spleen, as much of the blood as can be collected, with the contents of the urinary and gall bladders, should be severally removed and placed separately in appropriate vessels for analysis. It is well to remove the brain with any fluid that is present within the cranium, especially in the case of volatile poisons, and to preserve it as above described. All vessels should be closed so as to be as nearly air-tight as possible, and the mouths finally covered with paper securely tied, the knot of the string being well covered with sealing-wax impressed with the private seal of the medical man who makes the examination. Labels should be attached to the jars and bottles, on each of which a

description of the respective contents, with the name of the individual from whom they were derived, and the date of the necropsy, should be clearly written. Two lists of the jars and contents should be made; one being forwarded along with the jars to the analyst, or to the authorities who take charge of them meanwhile, the other being retained by the sender. The jars should pass through as few hands as possible; when feasible, the person who makes the post-mortem should himself deliver them to the analyst. They should be kept in a cool place, but no preservative should be added to their contents.

It is convenient and advisable that two practitioners should conjointly make the post-mortem examination. In case of doubtful or of obscure indications, the advice and countenance of a colleague is advantageous, and the division of labour - one practitioner making the section, and the other recording the results - adds to the completeness of the investigation and to the facility with which it is made. Every step should be accurately recorded at the time, or in event of the examination being made by one medical man only, immediately after its completion. If the notes are made by a colleague they should be read over on the spot by the operator, and then signed by both medical men. No other persons than those concerned in making the necropsy should be present. If a medical man is implicated, he must not be permitted to be present; he may depute another medical practitioner to represent him at the necropsy, but his representative must not take any active part in the proceedings. In all cases in which a legal inquiry is likely to take place, the medical practitioner in charge should refrain from making an examination until he receives an order from the coroner to do so. When an inquest is going to be held, the dead body is technically in the possession of coroner until he has issued his order for the burial, and, consequently, it may not be interfered with without his permission. In other cases the Anatomy Act of 1832 (2 & 3 Wm. IV., c. 75, sec. 7) provides that the executors, or other party having lawful possession of the body, may permit an anatomical examination to be made.

**Exhumation** - When suspicion of foul play arises after the body of the supposed victim has been interred, the coroner and the authorities at the Home Office may order the body to be exhumed and a medical inspection made. The medical man deputed to examine the body should be present at the exhumation, and should previously see that adequate provision is made for making a full investigation. A relative or friend of the deceased should be present at the exhumation in order to identify the body. When the interment has been recent an ordinary post-mortem examination can be made, but if the body has lain long underground decomposition will be more or less advanced and the usual post-mortem appearances destroyed. In such cases injuries to the bones, especially those of the skull, and in women the uterus (which resists putrefaction longer than the other soft organs) may afford valuable evidence. Most frequently, exhumations are undertaken in cases of suspected poisoning; in such cases, the stomach and intestines are to be removed - if recent, they should be ligatured as described in the directions for the ordinary examination, and placed in clean glass vessels well secured. The liver, spleen, and kidneys should also be removed. When the presence of a metallic poison is suspected, as mercury or arsenic, some of the bones should also be taken, the shaft of the femur, for example. If the interment was remote, so that the coffin is decayed, it is advisable in cases of mineral poisoning to remove a little of the surrounding earth for chemical examination. However far putrefaction is advanced, neither preservative fluid nor disinfectant must be used when making the post-mortem, nor added to the parts removed. The stage of the putrefactive changes in relation to the length of time the body has been interred should be noted.

CHAPTER VI.

## MODES OF DYING

IT is customary and convenient to speak of death as beginning in one of the three essential organs concerned in the maintenance of life the brain, the lungs, and the heart; failure of action on the part of any one of these organs speedily interferes with the functions of the other two. If the blood is insufficiently aerated in the lungs, the vaso-motor centres are irritated, and consequently the heart's action is impeded by the narrowing of the blood-channels, the musculature of the heart itself being enfeebled by impure blood-supply. If the heart does not propel the blood with sufficient activity through the lungs, the respiratory centres are ultimately paralysed. Again, if a blood clot presses on the centres in the medulla, both heart and lungs succumb. If the final obvious indications of life are to be accepted, the heart and the lungs are the organs which, by cessation of function, actually bring about somatic death. From this aspect the mention of death beginning in the head may be regarded as unnecessary; it is convenient, however, to retain Bichat's classification. It is to be borne in mind that, chiefly, the medical jurist is only concerned in the investigation of deaths which have resulted from violence; but not unfrequently he is called upon to investigate cases in which death was the result of disease - the manner of death, or the circumstances under which it took place, being suspicious of foul play.

The three modes of dying are - *Asphyxia, Syncope, Coma.*

### ASPHYXIA

When the respiratory function is arrested beyond a certain limit asphyxia is the result. There are various ways in which the interchange may be interrupted which normally takes place in the lungs between the blood and the air, viz.: -

The nervous supply to the respiratory muscles may be abolished either centrally (medulla), or peripherally (pneumogastrics or phrenics) Fixation of the respiratory muscles (tetanus or strychnine); mechanical pressure on thorax; collapse of lungs (pneumothorax); foreign bodies in the air passages, or closure of them by external compression (strangulation); drowning; respiring air deficient in oxygen; spasm of glottis from mechanical irritation (particles of food), or from irritant gases (Cl, $SO_2$), are each capable of producing death from asphyxia.

**Symptoms -** The phenomena of asphyxia may be divided into **three stages.** In the **first,** the respirations are deeper, more frequent, and more laboured than in the normal condition. The extraordinary muscles of respiration are called into action, and the struggle for air becomes more and more severe. The blood becomes more venous, and stimulates the respiratory centres, evoking violent attempts at respiration. In the **second** stage, the inspiratory muscles are less active, whilst the expiratory muscles contract energetically, as do also almost all the muscles of the body, producing general convulsions. In the third stage, the respiratory centres are paralysed. The pupils are widely dilated, consciousness is abolished, and the reflexes are

absent. A few gasps at long intervals, and all is over. Hughlings-Jackson (*British Med. Journ., 1892*) directs attention to absence of the knee-jerk when the blood is highly venous. In the earlier stages of asphyxia the knee-jerks are exaggerated, but when the third step is reached they are entirely lost.

**Post-mortem Appearances -** The right side of the heart, the pulmonary artery, the venae cavae, and the veins of the neck are gorged with dark venous blood. The left side is comparatively empty from post-mortem contraction (see under "**Cadaveric Rigidity").** The blood, nearly black, contains a large amount of $CO_2$, and, therefore, coagulates slowly. The haemoglobin is almost entirely reduced; ordinary venous blood contains a considerable amount of $O_2$ Hb as well as reduced Hb. (Landois and Stirling.)

## SYNCOPE

When the circulation suddenly fails, syncope is the result. The circulation may fail from cessation of the heart's action, the result of disease (aortic regurgitation, fatty heart, &c.), of inhibition (psychical shock, blow on the head, or reflexly from blow on epigastrium). The circulation may also fail from loss of blood (wounds of the large blood-vessels, or of the heart itself, profuse haematemesis, &c.) or from sudden withdrawal of blood from the circulation without loss (blows on the abdomen by paralysing the splanchnics may enlarge the vascular area of the abdomen to such an extent as to deplete the rest of the, system).

**Symptoms -** Pallor of the face, including the lips, dimness of vision, cold clammy sweat, sense of impending dissolution, craving for more air**,** great restlessness, gasping for breath, nausea, possibly vomiting, rushing sounds in the ears, momentary delirium quickly passing on to insensibility, followed by convulsions precede death. The whole of these symptoms are not always present. In simple fainting there may be only immediate loss of consciousness with cold surface and sighing respiration. In all cases the pulse is weak, irregular, or imperceptible. The condition called collapse, though attended by failure of the heart's action, differs from syncope inasmuch as the patient retains consciousness.

**Post-mortem Appearances -** When death has resulted from insufficient supply of blood to the heart, that organ has been found contracted and empty. When the cause of death has been heart-paralysis both sides have been found to contain blood. (See "**Cadaveric Rigidity.")**

## COMA

When from any cause affecting the brain insensibility is produced which terminates in death, the individual is said to die from coma. Increase of intra - cranial pressure, or dynamic disturbance of the cerebrum or of its circulation, may produce coma (concussion, haemorrhage, tumour, abscess, embolism, thrombosis, depressed fracture of the skull). Inflammatory processes (meningitis, &c.). Abnormal condition of the blood circulating through the brain (uraemia, certain poisons, as opium, alcohol, and that which produces the complication attending diabetes known as diabetic coma).

**Symptoms -** The symptoms produced by many of the causes of coma above enumerated may take the initial form of stupor, from which the patient may be partially roused for a few seconds or more. This condition subsequently deepens into profound insensibility, from which the patient cannot be roused. Some of the causes enumerated produce sudden coma without any antecedent stupor. In stupor the reflexes may be retained or even exaggerated, in coma they are

usually diminished or lost. Power to swallow fluids is consistent with stupor, but not with coma. A comatose person is utterly insensible to all external impressions; he lies powerless, breathing heavily, with stertor from paralysis of the soft palate. The surface is usually covered with a cold sweat, the temperature being at or below normal, except in lesions of the pons and a few other conditions. The pulse may vary, but is often full and laboured. The breathing becomes more and more embarrassed from diminished activity of the respiratory centres, and mucus collects in the air-passages, causing the form of breathing known as “the death rattle.” The pupils, either dilated or contracted, are insensitive to light, and the conjunctival reflex is lost.

**Post-mortem Appearances -** In some of the conditions which produce coma, examination of the brain reveals the cause. From what has been already said it will be apparent that the condition of heart and lungs is not constant. As a rule, they resemble more or less the condition found in death from asphyxia.