

Standard Operating
Procedure
For
Autopsy Examination

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MEDICO-LEGAL AUTOPSY PROCEDURES

Recommendation:

Every cases of unnatural death, with proper investigation of the scene by competent authority with one or more medico-legal experts should decide an autopsy to be carried out.

All unnatural deaths should undergo autopsy, to find out cause of death; in particular

- a) Frank case of homicides
- b) Suicides or suspected cases of suicide
- c) All cases of road accidents
- d) Sudden unexplained and unexpected death
- e) Dead during disasters for cause of death as well as proper positive identification
- f) Dead as a result of Medical Negligence
- g) Dead in police custody
- h) Dead as a result of human right violence
- i) Unidentified bodies
- j) Human skeletal remains

The medico-legal experts should perform his/her duty with dignity and conscience, his decision making should be total independence and impartiality. He / she should operate without any undue influence from law enforcement agencies and prosecutors.

I – Scene investigation

General principles:

Any dead body, obvious or suspected unnatural death should be first reported to the competent authorities (Nepal police), who will decide further investigation to be carried out.

Forensic doctor should be informed by investigating officer and visit the scene of death in any cases of suspicious death without delay. He should coordinate with the team involved in death investigation.

Examination of the body:

Role of the police:

Police should carry out following tasks at the scene of death:

- A. Presence of all people's identity should be recorded at the scene.
- B. Death body should be photographed as it is found
- C. Any weapon or objects like, bullet, bullet case, cigarette butt, etc. found at the scene should be noted and collected for further investigations.
- D. Identification of death body and information regarding those who have seen the decedent last alive from the scene witness should be obtained.
- E. The hand and feet of the deceased should be protected by using paper bag, until it reaches to the mortuary for further investigation.
- F. The integrity of the scene and surrounding should be preserve by cordoning.

Role of the medico-legal expert:

The medico-legal expert should without delay:

- a. Circumstance of death should be well informed.
- b. Proper photographic documentation of body should be undertaken.
- c. Make a note of position of body in relation with fixed objects, records the clothing, all visible injuries and distribution of rigor mortis, livor mortis and state of decomposition.
- d. Blood stain pattern over the body and surrounding at the scene should be noted and collect all biological materials as evidence.

- e. Preliminary examination of body need to be done.
- f. Try to estimate time since death from a record of rigor mortis, livor mortis and stage of decomposition.
- g. Transport the body to the morgue in a secure manner and temporarily store until further examination is done.

II – Autopsy physicians

It is a good practice to perform autopsies under supervision of qualified and competent medico-legal expert.

III – Identification

The general Assembly of Interpol in 1997, they have come up with the following criteria for the proper identification of the body during the Mass Disaster: Visual Recognition, Personal Effects, Physical Characteristics, Dental Examination, Anthropological Identification, Fingerprints and Genetic Identification.

Visual identification;

It is usually carried out by the close relatives of the deceased or any person who has seen him / her recently.

Personal effects;

Proper documentation of the clothing's, pocket contains; personal belongings (jewellery, wrist watch, ID card, ATM cards) may helps in narrow down the identification.

Physical characteristics;

The external and an internal examination are recorded for physical characteristics.

Dental examination;

Forensic odontologist or trained dentist should carry out proper examination of teeth and jaws.

Anthropological identification;

In all skeletonised human remains anthropological identification becomes crucial.

Fingerprints;

It is usually done by finger print experts and forensic doctor should assist in obtaining finger prints from deceased.

Genetic identification;

When all measures for identification becomes inappropriate, genetic identification should be carried out by an expert in DNA analysis. Caution should be taken to avoid contamination and proper storage of biological samples.

IV – General considerations:

1. All the medico-legal autopsies should follow the integrity of medical ethics and maintain the dignity of the deceased.
2. It is always good practice to give an opportunity to the relatives, to grieve and to pay their respect for their loved one before autopsy procedure.
3. Minimum measures should be taken before commence of autopsy examination:
 - a. Give each body for a unique case number, (viz FM074-0001)
 - b. Make a note of date and time of body received
 - c. Make a note of date, time and place of autopsy
 - d. Make a note of date, time and reference number of requisition letter from where it has been issued.
 - e. Record the name of experts and assistants and any persons present at the time of autopsy with their proper designation.
 - f. All the relevant findings should be photographed with scale and case number with and without clothing.
 - g. After undressing, clothing and personal belongings should be recorded and any damages over the clothing should be verify that corresponds to the injuries over the body.
 - h. X-ray examination should be considers in cases of any firearm injuries, complete charred body, suspected child abuse and identification and location of foreign objects.
4. All the body orifices have to be examined and take an appropriate swab for biological trace evidence, before internal examination.
5. All medical records must be obtained, if the deceased has been treated at the hospital.

V-Autopsy procedures:

Preliminary for Autopsy examination:

1. Authorization letter
2. Registration
3. Photography
4. External examination
5. Internal examination
6. Ancillary investigation
7. Cause of death
8. Handover of the body with dignity
9. Autopsy reports (Annex-B)

Authorization letter

The necessary documents authorizing the examination, from Nepal Police, as well as other documents including लासजाँच प्रकृति मुचुल्का and घटनास्थलमुचुल्का as well as medical record, if available, should be acquired.

In all case of found dead and sudden dead history should include:

- a. Circumstances of death:
 - Date,
 - Time and
 - Place of death (e.g. at home, at rest, after ingesting medication or food, during exercise)
- b. Whether the death occurred under suspicious circumstances
- c. Past medical history-
 - General state of health,
 - Significant past medical disease (e.g. hypertension, diabetes, Ischaemic heart disease, malignancy, sickle cell disease, Chronic Obstructive Pulmonary Disease (COPD), Tuberculosis, Chronic renal failure, occupational lung disease, peptic ulcer disease, inflammatory bowel disease, psychotic or depressive diseases)

- d. History of medication- eg:
 - Anti psychotic drugs, cardiac drugs.
- e. History of narcotic drug or alcohol abuse
- f. Family history- e.g.
 - Genetically transmitted disease,
 - Ischaemic heart disease,
 - Emphysema,
 - Diabetes,
 - Hypertension, etc.
- g. History of recent surgical interventions-
 - Cardiac surgery,
 - Interventional cardiac procedures,
 - Barium enema,
 - Endoscopic procedures,
 - Bronchoscopic biopsies,etc.
- h. Investigation findings-
 - ECG findings,
 - Serum electrolytes,
 - Blood urea/ serum creatinine,
 - Radiological findings (Chest X-ray, ultrasound examination, CT scan)

Registration

All the body brought into the mortuary should be registered with a unique identification code.

The unique identification code could include

FM – 2074 - 0123

- Identification code for institute
E.g. – **FM – Forensic Medicine**
- Year of examination
E.g. – **2074 – 2074 B.S.** (or 2074/01 – Baisakh 2074 B.S.)
- Case number
E.g. – **0123 – Case # 123 for the year 2074**
- The body should be tagged with label bearing the unique identification code. If the body is to be stored in a body bag, labels should be tagged to the body as well as the body bag.
- The labels used should be written in permanent, indelible ink on a water proof tag.
- The personal details should not be included on the tag. The personal details should be registered on a registration form as provided in Annex-A.
- The documents should all be included in a folder and confidentiality of the documents maintained.

Photography

- Photography should be carried out in a systematic and clock-wise manner and overall view, midrange and close up should be taken in every case.
 - a. Overall view – for seeing relationship of body or injury with other objects.
 - b. Mid range- relationship photograph with other immediate body part.
 - c. Close-up – for detail of injury or item in view

- All photographs should be taken with reference number and scale.

Minimum photographs in routine cases are:

- Scene photographs if scene is visited by Medical Officer or given by Investigative Officer (print/cd/pendrive).
- Photograph indicating condition of body with clothing when brought.
- Total body photographs – Front, back and both sides

- Routine –
 - a. Face,
 - b. Face and trunk,
 - c. Groin and thigh,
 - d. Lower limbs from front and
 - e. Back of body.
- Specific – Injury/lesion in relation to body; close-up shots.
- Cause of death findings.

External Examination

- a. Length and body build
- b. Complexion
- c. Colour of the hair and eyes
- d. Secondary sexual characteristics
 - Male-Beard and moustache, axillary hair, pubic hairs and external genitalia
 - Female – Breast, areolas and nipple.
- e. Identification Marks- e.g.
 - Scars,
 - Tattoos,
 - Moles,etc
- f. Signs of treatment- e.g.
 - ECG leads,
 - IV canulation,
 - DC fibrillator marks, etc.
- g. Any obvious disabilities (e.g. amputated limbs, contractures)
- h. General examination;-
 - Pallor,
 - Jaundice,
 - Cyanosis,
 - Swelling of the limbs,

- Xanthelasma,
 - Rashes,
 - Petechial haemorrhages, etc.
- i. Post-mortem changes-
- Rigor mortis (jaw, neck, all joints),
 - Livor mortis (site, colour and fixed or blanched)and
 - Signs of decompositions (purging, greenish discoloration, gaseous distension, marbling, skin peeling, etc.)
- j. Description of Injuries:
- Type (blunt/sharp/burn/firearm),
 - Size (two dimension in cm /length x width),
 - Anatomical site,
 - Exact location (from fixed land mark, e.g.From top of head and ante/posterior-midline),
 - Age of injury (color / signs of healing),
 - Contamination (extraneous materials, e.g. dirt, vegetation, etc.),
 - Edge (clean cut/ irregular/ ragged),
 - Depth (anatomical layer, e.g. skin, subcutaneous, muscle or bone deep),
 - Direction (anatomical plane e.g. forward/downward/medially/ laterally/ horizontal/vertical/etc.),
 - Pattern /Shape (imprint of objects), etc.

Internal Examination:

(Evisceration:- Leutelle method/Virchow method/Ghon method/Rockystansky method:
depending on case and prosector)

a) Examination of chest cavity:

1. Pleural cavity-

- Examine for the nature of the effusion ;
 - a. Color of fluids
 - b. Blood stained,
 - c. Pus,
 - d. Whitish (chylous)
- Examine for Pneumothorax

i. Examination of the heart:

- The pericardial cavity;
 - a. Effusions,
 - b. Adhesions, and
 - c. Hemopericardium.
- Examine right atrium, right ventricles and great vessels-Air embolism
- The great vessels –
 - a. Inspect for origin and
 - b. Transacted for thrombi or emboli.
- The major coronary arteries and their branches-
 - a. Origin and its distribution,
 - b. occlusion and
 - c. Calcification
 - d. (The coronary arteries cut at 3mm intervals transversely to look for occlusion, obstruction by thrombi and calcification)
 - e. The aorta, pulmonary artery and coronary ostia should be examined for any abnormalities.
- Cardiac chambers can be open;
 - a. Inflow and out flow method (cut open in direction of normal blood flow)

- b. Long axis method (cut apex to base)
 - c. Short axis (cut perpendicular to interventricular septum) or
- The atria should be opened into and the valves should be checked for
 - a. Thrombi,
 - b. Vegetations,
 - c. Valvular abnormalities,
 - d. Congenital abnormalities,
 - e. Abnormality of the valve rings,(e.g. bicuspid valves),
 - f. Valve rupture/ papillary muscle rupture in ischemic heart disease.
- Short axis- The ventricle should be cut at 1 cm intervals from apex to mid ventricular level and cut open in the direction of blood flow to look for
 - a. Symmetry,
 - b. Ischemic/ hemorrhagic lesions,
 - c. Fibrosis,
 - d. Thrombi,
 - e. Aneurysms, and
 - f. Hypertrophy.
- The thickness of the myocardium should be measured in the posterior wall of the left ventricle (approximately 1 cm below the mitral valve) and at the septum.
- The weight of the heart should be measured after emptying the blood and correlated with age, sex and body weight of the individual.
- Representative blocks from lesions in the myocardium of the posterior wall of the left ventricle and septum in cases of ischemic heart disease and cardiomyopathy.
- Other relevant tissue based on observations.

ii. Examination of the lungs:

- Pleura -
 - a. Adhesions (past infection)
 - b. Nodules,

- c. Plaques (asbestosis) and
 - d. Tumour (e.g. mesothelioma)
- Each lung should be separated across the main bronchi at the level of bifurcation of the trachea.
- Trachea-bronchi should be longitudinally cut open up to look for ;
 - a. Collected secretions,
 - b. Foreign bodies,
 - c. Dilatation (bronchiectasis),
 - d. Inflammation (Bronchitis),
 - e. Mucus plugs,
 - f. Casts and mass (tumour).
- Lungs should be examined externally for;
 - a. Haemorrhagic spots (in asphyxia),
 - b. Pleural thickening (past infection),
 - c. Adhesions (infection),
 - d. Puckering (underlying tumour)
- Lungs should be cut in the coronal plane from hilum to the pleura, washed and examined for;
 - a. The consistency of the cut surface,
 - b. Areas of consolidation,
 - c. Abscesses,
 - d. Apical cavities,
 - e. Fibrosis,
 - f. Emphysema,
 - g. Caseous necrosis, and mass (tumor)
- Presence of enlarged hilar nodes, their consistency and the presence of caseation should be noted.
- Each lungs should be weight after dissection.

b) Examination of the abdominal cavity:

- Abdominal cavity- Examine for;

- a. Collection of fluids
- b. Collections of pus,
- c. Blood and clots
- d. Stomach contents/Faecal matter,
- e. Rupture of a hollow viscus,
- f. Evidence of recent surgical intervention
- g. Presence of mesenteric nodules, or tumour deposits.

i. Examination of Gastrointestinal system

- The mouth, tongue and oesophagus should be examined for;
 - a. Ulcers,
 - b. Injuries and
 - c. Mass/Tumours.
- The stomach –
 - a. Separated at the cardiac and the pyloric ends.
 - b. Placed in a container and opened along the greater curvature.
 - c. The contents of the stomach should be collected, the colour, smell and presence of blood should be noted, and the contents collected and sent for further investigation if necessary.
 - d. The internal surface of the stomach should be examined for erosions, ulcers and mass (tumor).

ii. Examination of the intestines-

- a. The entire intestine (small and large) should be cut open and the cut surface examined for injury, ulceration, strictures, toxic dilation, volvulus, gangrene and tumours.
- b. The mesentery should be examined for haemorrhage, injury and tumour deposits.

iii. Examination of the Hepato-biliary System and Pancreas

- The liver-
 - a. Should be separated, weighed and sliced at 1cm intervals.
 - b. Note the colour and consistency of the liver.

- c. Examine for injury, fatty change, cirrhosis, cystic lesions and primary or metastatic tumour.
 - d. The gall bladder is dissected with the biliary tract up to the opening at the duodenum.
 - e. The patency of the biliary tract, presence of stones or tumour in the gall bladder or biliary tract is noted.
- The pancreas-
 - a. Should be opened in the longitudinal axis.
 - b. Examine the pancreas for haemorrhage, necrosis and tumours
- Representative samples from suspected areas including the hilar region.

iv. Examination of the Spleen

- The spleen-
 - a. Should be separated at the hilum and weighed.
 - b. Should be sliced at 1 cm intervals.
 - c. Examined for rupture, infarction, diffuse nodularity, and focal lesions.

v. Examination of the kidneys, ureters and bladder

- The kidneys, ureters and bladder can be dissected en- bloc or separately.
- The kidneys are separated from the adrenals and each kidney weighed separately.
- The renal artery is examined for stenosis.
- The capsule of the kidney should be stripped and the surface examined for
 - a. Nodularity,
 - b. Scarring,
 - c. Cysts,
 - d. Petechial haemorrhages,
 - e. Abscess formation.
- The kidneys should be cut open longitudinally and examined for;
 - a. Calculi,
 - b. State of the pelvis,

- c. Corticomedullary demarcation,
 - d. caseation,
 - e. Abscess formation, or tumour.
- The ureters are opened longitudinally and examined for;
 - a. Patency,
 - b. Calculi,
 - c. Pus,
 - d. Focal lesions and
 - e. Tumour.
- The bladder contents should be syringed out and the bladder cut open to look for;
 - a. Injury,
 - b. Calculi,
 - c. Hypertrophy of the bladder wall,
 - d. Haemorrhage or tumour.

vi. Examination of the pelvic organs:

- After the completion of abdominal evisceration, the prosector first give a diamond shaped incision over the skin enclosing the external genitalia.
- The incision should penetrate into the deep soft tissue bounded laterally by ischio-pubic rami, anteriorly by the pubic symphysis, and posteriorly by the coccyx.
- The internal incision is given along the pelvic inlet, enclosing the pelvic organ.
- The rectum and adjacent soft tissues are dissected away from the sacrum and urinary bladder is dissected away from the pubis.
- The pelvic organs including the bladder, urethra and rectum, with vagina, cervix, uterus, fallopian tubes and ovaries in the female, and the prostate and the testes in the male are dissected out.

Uterus, fallopian tubes and ovaries

- The uterus should be weighed and examined for
 - a. Evidence of pregnancy,
 - b. Abortion,
 - c. Products of conception,
 - d. Foreign bodies
 - e. Instrumentation,
 - f. Rupture,
 - g. Haemorrhage,
 - h. Placental parts and tumours.
- The fallopian tubes should be examined for ectopic pregnancy or tumour.
- The ovaries should be weighed and examined for corpus luteum, cysts or tumour.
- The entire block can be subjected for histopathological analysis to rule out any pathological lesions or product of conception.

Prostate and testes:

- The prostate should be dissected out through the abdomen after making an incision at the pelvic outlet, weighed and examined for tumour.
- The testis is removed by making a small incision in the inguinal canal and pushing the testes out of the inguinal canal.

c. Examination of the brain:

- The scalp incision is made joining the mastoid processes across the vertex and the scalp reflected making note of any hemorrhage or other abnormalities. The skull is opened with a saw by a horizontal incision at the level of glabella, extending backwards at the level of pterion, up to the occiput.
- The tentorium, blood vessels and nerves at the base of the skull are cut and the brain separated from the spinal cord at the deepest level while supporting the brain with palms and fingers.
- The tentorium is examined for haemorrhages.
- The Circle of Willis should be carefully dissected out and opened longitudinally to examine for thrombosis, atherosclerosis and aneurysms.
- The brain should be weighed and examined externally for areas of haemorrhage, injury, flattening of gyri and narrowing of sulci in cases of increased intracranial pressure.
- The levels of the slices should include the anterior margin of the temporal lobe, anterior margin of the optic chiasma, mammillary bodies, midbrain at the posterior end of the substantia nigra, and occipital lobe.
- The slices should be examined for
 - a. Asymmetry,
 - b. Areas of haemorrhage,
 - c. Cystic lesions,
 - d. Cavity formation from infarction,
 - e. Ventricular dilatation,
 - f. Blood in ventricles
 - g. Abscesses.

- The cerebellum is cut in the coronal plane and the nuclei examined for haemorrhages and infarction.
- The brain stem is sliced at 4mm intervals and examined for haemorrhages, infarctions and tumour.

e. Examination of the spinal cord:

- Examination of spinal cord not routinely carried out, it is performed in special circumstances where pathology of the spinal cord is suspected.
- Posterior approach of spinal cord examination the body is placed face down on the autopsy table.
- A midline skin incision is made from the occiput to the buttocks.
- The posterior vertebral muscles are separated up to the vertebral column.
- The posterior laminae with their interconnecting ligaments are cut with a saw and the posterior wall of the spinal cord is removed.
- The spinal cord should be carefully dissected out.
- Better result can be obtained by examined after fixation in formalin for weeks.
- It should be cut at 4mm slices or less and examined for the suspected pathology.

Ancillary investigation:

- For toxicological analysis-
 - a. Peripheral blood
 - b. Stomach with its entire content,
 - c. Each half of kidneys
 - d. At least 200gms of right lobe of liver
 - e. In case of advance decomposition muscles can be preserved for toxicological analysis.
(Collect and preserve in saturated sodium chloride solution)
- For histological examination- tissue sample from solid organs (depending on case requirement);
 - a. Brain,
 - b. Heart,
 - c. Lungs,
 - d. Kidney and
 - e. Spleen
(Collect and preserve in formalin).
- X-ray examination should be considered-
 - a. All infant death,
 - b. Firearm injuries,
 - c. Charred body and
 - d. Death from explosives injuries.
- All the biological samples must be collected in tightly closed jars, well preserved and sealed with labelling and transported, strictly maintaining chain of custody.

Release of the body;

- The body should be hand over to the family member with dignified condition, after complete medico-legal examination done by the doctors.

SPECIFIC PROCEDURES (SELECTED EXAMPLES)

1. Asphyxial death (external/internal airway obstructions)

The following procedure is in addition to what described under Autopsy

Procedure:

Scene visit

- a. Scene visit should be carried out as indicated or at least assessment should be done on basis of SOCOs report and photographs provided by investigating police officer.
- b. All scenes should be visited, accompanied by the police.
- c. In the cases of hanging, measurements from ground to the hanging point (Suspension Point), height of the support to reach the suspension point, must be documented.
- d. Scene must be examined for signs of violence and circumstantial evidences.
- e. Scene visit/assessment is always educative to give clear opinion which saves precious time of medical and investigative personnel.
- f. Photography should be taken before moving the body.

External Examination:

- a. Dribbling of saliva;
 - Face,
 - Neck and
 - Clothing
- b. Ligature must be described with special reference:
 - Width,
 - Length,
 - Presence of cut ends and
 - Description of the knots (fixed/ slip knots).

- c. The ligature mark is very important evidence, as it reproduces the pattern and dimensions of the ligature itself.
- d. Description of ligature mark (abraded contusion) with reference –
 - Color,
 - Parchmentized or non-parchmentized
 - Width,
 - Length,
 - Direction and
 - Complete/ incomplete- Encircled.
 - Peri ligature injuries
- e. Distribution of hypostasis must be described and interpreted in relation to the posture.
- f. Comment on the presence of petechial hemorrhages, congestion of head and neck, sub-conjunctival hemorrhages of eyes.
- g. Comparison of abraded injury and the ligature must be done.
- h. In case of female, external genitalia and anus must be examined for injuries and sexual penetration.

Internal Examination

- a. Neck structures to be dissected layer by layer in a bloodless field, after evisceration of brain and thoracic block to note soft tissue injury.
- b. Presence or absence of neck injuries (contusions, hematoma or fractures) over;
 - Soft tissue (platysma, neck muscles)
 - Blood vessels,
 - Thyroid cartilage,
 - Hyoid bone and
 - Laryngeal cartilages
- c. Special comment must be made on the integrity of the cervical spine.
- d. Blood sample for toxicological analysis should be collected, where body found hanging, in suspicious circumstances.

2. Drowning/Immersion:

The following procedure is in addition to what described under Autopsy Procedure:

Detail regarding the circumstance of the body found should be documented.

Note carefully the following findings:

External Examination

- a. Body must be examined with
 - Clothes,
 - Shoes and
 - Pocket contents must be documented.
- b. Examine for signs of immersions
 - Washer Woman hands and feet,
 - Cutis anserina
- c. Presence of cadaveric spasm must be documented
- d. Presence or absence of tenacious foam at mouth and nostrils must be documented and photographed is recommended
- e. Any injury found on the body must be documented, lesions can occurs due to water animals, injuries due to surroundings (for example rocks and ships),
- f. Localization of livor mortis to be noted.

Internal Examination

- a. Precise description of the lungs;
 - Voluminous with rib indentation
 - Hemorrhagic spots over lungs surface
 - Weight
- b. Tracheobronchial tree examined for;
 - Froth,
 - Extraneous materials (mud or sand particles)
- c. Gastric content should be examined and collected.

- d. Distant organs like lungs, liver, kidney, brain and bone for the possible demonstration of diatoms and other contaminants should be collected. If required, sampling of drowning medium (e.g. river water, pond water) should be carried out.
- e. For ancillary investigation, to rule out other causes of death, blood and visceral samples should be collected, depending upon circumstance of cases.

3. Infant death:

The following procedure is in addition to the procedures described under Autopsy procedure.

History

- Marital status of parents,
- Antenatal history of the pregnancy,
- Birth history and
- Post natal complications of the infant and the mother must be looked into in detail.

Preliminaries

- a. If the Placenta is available, it must be examined and necessary samples must be taken for histology and genetic screening. Umbilical cord must be examined.
- b. Measurements of baby;
 - Weight,
 - Crown rump,
 - Crown heel length,
 - Head circumference,
 - Chest circumference at level of nipple and
 - Abdominal circumference at the level of umbilicus
- c. Presence or absence of clothing must be noted.

External Examination

- Injuries and abnormalities must be documented and photography must be done.
- Describe the site of caput succedaneum,
- Maturity of the baby must be estimated.
- Any congenital abnormality, incompatible with life must be noted.
- Examination of Umbilical cord in detail (Length, ends, Watson Jelly).

Internal Examination

- Skill should be applied to remove cerebral hemispheres to examine falx cerebri and tentorium cerebelli to exclude hemorrhage during birth.
- Cardiovascular and respiratory systems must be dissected en bloc.

- Special care is to be applied to the thoracic organs: Degree of inflation of the lungs, must be examined for signs of respiration.
- Flotation test ‘en bloc’ and ‘en detail’ should perform. However, the limitations of the flotation test must be appreciated.
- Gastrointestinal system must be examined for presence or absence of food materials and samples must be retained for further analysis.
- Examine (long bone, sternum and foot bone) centres of ossification (size and presence) for maturity.
- All malformations must be described.
- The umbilical cord and the placenta must be subject to morphological and histological examination if require.

4. Autopsy in death due to Gross Human Rights Violation and death due to torture:

Scene investigation:

Whenever possible scene of death should be visited by a doctor and all features documented, using photography, sketch or drawing of circumstance of scene as well as body.

Autopsy:

- The following Protocol should be followed during the autopsy in addition to the procedures described under Autopsy procedure.

Preliminary:

- a. Serial photographs reflecting the course of the external examination must be included. Photograph the body prior to and following undressing, washing or cleaning and shaving.
- b. Photographs should be comprehensive in scope and must confirm the presence of all demonstrable signs of injury or disease commented upon in the autopsy report.
- c. X-ray should be considered in case of charred body and gunshot injuries.

External examination:

General:

- a. The most important portion of autopsy is evidence of external injuries.
- b. Document all injuries, record;
 - Size,
 - Shape,
 - Pattern,
 - Location (related to obvious anatomic landmarks),
 - Colour,
 - Direction,
 - Depth and structure involved.

- c. Photograph all injuries with unique identification number and scale that is oriented parallel or perpendicular to the injury.
- d. Note and photograph;
 - Scars,
 - Areas of keloid formation,
 - Tattoos,
 - Areas of increased or decreased pigmentation, and
 - Anything distinctive or unique such as birthmarks.
- e. Note any bruises and incise them for delineation of their extent.

Head and neck:

- a. Shave hair where necessary to clarify an injury, and take photographs before and after shaving and washing the site of any injury.
- b. Examine the teeth and note their condition. Record any that are absent, loose or damaged, and record all dental work (restorations, fillings, etc). Check the inside of the mouth and note any evidence of trauma, injection sites, needle marks or biting of the lips, cheeks or tongue. Note any articles or substances in the mouth.
- c. In cases of suspected sexual assault, save oral fluid or get a swab for spermatozoa and acid phosphatase evaluation. (Swabs taken at the tooth-gum junction and samples from between the teeth provide the best specimens for identifying spermatozoa.) Also take swabs from the oral cavity for seminal fluid typing. Dry the swabs quickly with cool, blown air if possible, and preserve them in clean plain paper envelopes.
- d. Examine the nose and ears and note any evidence of trauma, haemorrhage or other abnormalities.
- e. Examine the tympanic membranes.
- f. Examine the neck externally on all aspects and note any contusions, abrasions or petechia.

Chest and abdomen:

- a. Note any bite marks; these should be photographed to record the dental pattern, swabbed for saliva testing (before the body is washed). Bite marks should also be analyzed by a forensic odontologist, if possible.
- b. The length of the back and the buttocks must be systematically incised to look for deep soft tissue injuries.
- c. Note any injection sites or puncture wounds and excise them to use for toxicological evaluation.

Extremities:

- a. Examine all surfaces of the extremities: arms, forearms, wrists, hands, legs and feet, and note any "defence" wounds.
- b. Note any broken or missing fingernails. Save finger nail clippings and any under-nail tissue (nail scrapings).
- c. Examine the fingernail and toenail beds for evidence of object having been pushed beneath the nails.
- d. Wrists and ankles must be systematically incised to look for deep soft tissue injuries.
- e. The shoulders, elbows, hips and knee joints must also be incised to look for ligamentous injury.
- f. Carefully examine the soles of the feet, noting any evidence of beating. Incise the soles to delineate the extent of any injuries. Examine the palms and knees, looking especially for glass shards or lacerations;

Genitalia:

- a. Examine the external genitalia and note the presence of any foreign material or semen.
- b. Note any injury to the inner thighs or peri-anal area. Look for peri-anal burns;
- c. In cases of suspected sexual assault, examine all potentially involved orifices. A speculum should be used to examine the vaginal walls.
- d. Collect foreign hair by combing the pubic hair.
- e. Aspirate fluid from the vagina and/or rectum, for acid phosphatase, blood group and spermatozoa evaluation. Take swabs from the same areas for seminal fluid typing. Dry the swabs quickly with cool, blown air if possible, and preserve them in clean plain paper envelopes;

Internal examination:

- a. The internal examination for internal evidence of injury should clarify.
- b. Be systematic in the internal examination as mentioned in autopsy procedure.
- c. Deep incision of soft tissues over palms, sole, back, buttocks, all four extremities should be performed to demonstrate soft tissue injuries.

Notes:

- b. After completion of the autopsy, record the specimens that have been collected.
- c. Label all specimens with the name of the deceased, the autopsy identification number, the date and time of collection, the name of the prosecutor and the contents.
- d. Carefully preserve all evidence and record the chain of custody with appropriate release forms.
- e. Perform appropriate toxicological tests and retain portions of the tested samples to permit retesting.

5. Postmortem examination in case of poisoning:

The following procedure is in addition to the procedures described under Autopsy procedure.

In our context toxicological analysis is carried out in case of

- Frank case of poisoning
- Suspicious deaths when no cause of death is found
- Suspected poisoning from circumstantial evidence
- Air crash (Captain and Co-pilot),
- Drivers in case of road traffic accidents and pedestrians.
- Hospital deaths or death during surgery (to determine the level of drugs given at the hospital).

In case of Hospital stay and treatment:

- If the deceased was admitted in hospital then the 1st sample of gastric lavage should be collected, similarly blood and urine sample if available should be collected and sent to Forensic Science lab.
- Vomits and vomitus stain over cloths should be collected and send for toxicological analysis.
- In cases physical assault and road accidents, blood is usually drawn immediately on admission to the emergency room and sent to the blood bank for typing and cross-match; it should then be retained in the blood bank for at least 2 weeks. This sample can later be used for toxicological analysis if required.

External Examination:

- a. Any abnormal odor from the body should be noted;
 - Petroleum - Organophosphorus poisoning,
 - Garlic - Phosphorus containing poisons (Aluminum Phosphide, Arsenic),
 - Bitter almond - Cyanide poisoning.
- b. Suspicious stains over the body and clothes should be collected and sent to Forensic lab.
- c. Careful head to toe examination is then carried out;
 - Head hair -(Patchy alopecia is seen in arsenic poisoning, which could be accidental exposure at work),
 - Nails -(Mees line in heavy metal poisoning,
 - Skin pigmentation -Heavy metal poisoning,
 - Icterus -Hepatotoxic poisons
- d. Any details regarding injuries should be well documented, including;
 - Burns -(Chemical burns),
 - Puncture marks over the skin.

(In case of puncture marks on skin, surrounding 2cm of skin should be excised and sent to Forensic Science lab)
- e. Careful examination of hypostasis should be done as it may indicate certain Poisons;
 - Cherry red -Carbonmonoxide poisoning,
 - Bright red -Cyanide poisoning,
 - Yellowish or brownish -Phosphorus poisoning.

Internal Examination

- a. The importance of internal examination in case of poisoning or toxin related death is to rule out natural disease processes. The findings of internal examination can also help correlate the symptoms produced by the poison or toxins.
- b. Colour of blood should be noted, which is cherry red in case of carbon monoxide poisoning. Similarly muscles also appear cherry red in case of carbon monoxide poisoning.
- c. In case of irritant and corrosive poisons, careful examination of ;
 - Tongue,
 - Esophagus,
 - Stomach(should be done to note for any abnormal smell, stains, congestions, mucosal edema, erosions, ulcers and perforations.)
- d. Heart should be examined for signs of myocardial infarction, even if the coronary arteries are patent. Some drugs such as Cocaine can cause severe vasospasm and cause death from myocardial infarction and arrhythmias.
- e. Lungs should be examined for signs of edema.
- f. Other organs such as liver should be examined for signs of hepatitis (Enlarged, yellowish liver).

At the end of autopsy, even after the above mentioned findings are present the cause of death cannot be ascertained to a particular poison. For determining the cause of death as poisoning the poison or toxin should be present in the body in fatal dose. So, we should collect samples from the body and sent for toxicological analysis.

Samples to be collected:

Currently in our context following samples are collected for toxicological analysis in case oral ingestion:

- Stomach with its entire content
- Piece of liver (200-300gms)
- Half of each kidney

- For visceral sample saturated sodium chloride is use as preservatives.
- In case of suspected alcohol intoxication and carbon monoxide poisoning, at least 10ml of blood is collected (preserved in sodium fluoride for alcohol analysis and for carbon monoxide poisoning blood sample is sealed with paraffin without any preservatives).

ANNEX A

Annex A - Autopsy Notes

1. Case registration number:
2. Police Office sending for autopsy:
 - a. Date
 - b. Reference Number
3. Name of the deceased:
4. Address:
5. Gender:
6. Age/Date of Birth:
7. Dead body identified by:
8. Name of accompanying Police Personnel:
9. Date and time of death:
10. Date and hour of receipt of
 - a. Dead body
 - b. Inquest papers
11. Date and hour of starting autopsy:
12. Date and hour of concluding autopsy:
13. Name of the Experts conducting autopsy:
 - a. Faculty
 - b. Residents:

Photographs –

Relevant Details:

- Details of incident as per autopsy request letter:
- Hospital record:
- History provided by family:

ANNEX A

Length - _____ in/ _____ cm

Clothing

Item of clothing	Material	Colour	Size	Label	Peculiarities

Eyes - opened or close

Nose – discharge

Mouth – discharge

Tongue – protruding/bitten

Ears – discharge

Secondary Sexual characters

Male	Female
Thyroid cartilage	Thyroid cartilage
Hair <ul style="list-style-type: none"> • Baldness • Moustache • Beard • Axillary hair • Pubic hair • Body hair 	Hair <ul style="list-style-type: none"> • Thinning • Axillary hair • Pubic hair
<ul style="list-style-type: none"> • Areola <ul style="list-style-type: none"> ○ Colour ○ Size • Nipple <ul style="list-style-type: none"> ○ Size ○ Everted/inverted 	<ul style="list-style-type: none"> • Breasts • Areola <ul style="list-style-type: none"> ○ Colour ○ Size • Nipple <ul style="list-style-type: none"> ○ Size ○ Everted/inverted ○ Lactation
Genitalia <ul style="list-style-type: none"> • Scrotum and testes • Penis 	

Post-mortem changes

	Jaw	Neck	Upper limb	Lower limb	
Rigor Mortis					

Livor mortis

- Site -
- Colour -
- Fixity -

Signs of decomposition

	Greenish discoloration	Marbling	Purging	Gaseous distension	Blister formation	Peeling of skin
Site						

Sign of treatment:

ANNEX A

Injuries

Injury Number	Type	Size	Site	Location	Colour	Number (Count if <10)	Base (underlying structures)	Direction	Age of injury
Part of body Number		L B		__ cm from __ cm from		Number Area L B			
Part of body Number		L B		__ cm from __ cm from		Number Area L B			
Part of body Number		L B		__ cm from __ cm from		Number Area L B			
Part of body Number		L B		__ cm from __ cm from		Number Area L B			
Part of body Number		L B		__ cm from __ cm from		Number Area L B			
Part of body Number		L B		__ cm from __ cm from		Number Area L B			
Part of body Number		L B		__ cm from __ cm from		Number Area L B			

ANNEX A

Injury Number	Type	Size	Site	Location	Colour	Number (Count if <10)	Base (underlying structures)	Direction	Age of injury
Part of body Number		L B		__ cm from __ cm from		Number Area L B			
Part of body Number		L B		__ cm from __ cm from		Number Area L B			
Part of body Number		L B		__ cm from __ cm from		Number Area L B			
Part of body Number		L B		__ cm from __ cm from		Number Area L B			
Part of body Number		L B		__ cm from __ cm from		Number Area L B			
Part of body Number		L B		__ cm from __ cm from		Number Area L B			
Part of body Number		L B		__ cm from __ cm from		Number Area L B			

(Please describe in detail on the back of this page, if required)

ANNEX A

Internal Examination

Incision

- Torso –
- Head –

Chest wall/Abdominal wall/Facial tissue/Scalp tissue

Evisceration: Letulle / Rokitansky / Ghon / Virchow

Organ Examination

Heart	Weight Coronaries <ul style="list-style-type: none"> • LAD • LCx • RCA Valves <ul style="list-style-type: none"> • Tricuspid • Mitral • Aortic • Pulmonary Myocardium Aorta and major vessels	
Lungs	Trachea Brochii and Bronchioles	
	Right lung <ul style="list-style-type: none"> • Weight • Upper lobe • Middle lobe • Lower lobe 	Left lung <ul style="list-style-type: none"> • Weight • Upper lobe • Middle lobe • Lower lobe
Liver	Wt of liver (with gall bladder)	Wt of gall bladder
	Right lobe Left lobe	with bile Empty Gall bladder
Kidneys	Wt: Right Right kidney <ul style="list-style-type: none"> • Weight • Cortex • Medulla • Pelvis • Adrenal • Ureter 	Left kidney <ul style="list-style-type: none"> • Weight • Cortex • Medulla • Pelvis • Adrenal • Ureter
	Urinary Bladder	
Stomach	Contents Mucosa	
Intestines	Small Large	
Pancreas	Weight	

(Please describe in detail on the back of this page, if required)

ANNEX A

Brain	Wt Cerebrum Cerebellum Brain Stem Ventricles	Meninges Dura Arachnoid Pia Vasculature
Genitalia	Male Perineum Scrotum Testis Penis	Female Perineum Vagina Uterus Ovaries
Cranial cavity	<ul style="list-style-type: none"> • Extra-dural/Epi-dural space • Sub-dural space • Sub-arachnoid space • CSF • Vasculature 	
Thoracic cavity	<ul style="list-style-type: none"> • Chest wall • Sternum • Ribs • Pleural Cavity • Mediastinum • Thoracic Vertebra • Vasculature • Lymphatics 	
Abdominal cavity	<ul style="list-style-type: none"> • Abdominal wall • Peritoneal cavity • Omentum • Lumbo-Sacral Vertebra • Vasculature • Lymphatics 	
Samples collected	<ul style="list-style-type: none"> • Blood • Viscera • Urine • Others 	
Other significant findings:		

(Please describe in detail on the back of this page, if required)

ANNEX A

Special examination

Neck Dissection	<input type="checkbox"/> Sub-cutaneous tissue <input type="checkbox"/> Muscles <input type="checkbox"/> Cartilage ad bones <input type="checkbox"/> Trachea <input type="checkbox"/> Oesophagus <input type="checkbox"/> Cervical Vertebra <input type="checkbox"/> Vasculature <input type="checkbox"/> Nerves <input type="checkbox"/> Lymphatics	
Pelvis Dissection	<input type="checkbox"/> Perineum <input type="checkbox"/> Vagina <input type="checkbox"/> Cervix <input type="checkbox"/> Uterus <input type="checkbox"/> Fallopian tubes <input type="checkbox"/> Ovaries <input type="checkbox"/> Anus <input type="checkbox"/> Rectum <input type="checkbox"/> Pelvic ligaments <input type="checkbox"/> Urinary Bladder <input type="checkbox"/> Urethra <input type="checkbox"/> Vasculature <input type="checkbox"/> Nerves <input type="checkbox"/> Lymphatics	<input type="checkbox"/> Perineum <input type="checkbox"/> Prostate <input type="checkbox"/> Penis <input type="checkbox"/> Testis <input type="checkbox"/> Anus <input type="checkbox"/> Rectum <input type="checkbox"/> Pelvic ligaments <input type="checkbox"/> Urinary Bladder <input type="checkbox"/> Urethra <input type="checkbox"/> Vasculature <input type="checkbox"/> Nerves <input type="checkbox"/> Lymphatics
Vertebral Dissection	<input type="checkbox"/> Para-vertebral soft tissue <input type="checkbox"/> Vertebral column <ul style="list-style-type: none"> <input type="checkbox"/> Body <input type="checkbox"/> Lamina <input type="checkbox"/> Processes <input checked="" type="checkbox"/> Spinal Column	
Other special examination (including skeletal, decomposed, vasculature, genito-urinary etc.)		

ANNEX B

ANNEX B – AUTOPSY REPORT

1. Case registration number:
2. Police Office sending for autopsy:
 - a. Date
 - b. Reference Number
3. Name of the deceased:
4. Address:
5. Gender:
6. Age/Date of Birth:
7. Dead body identified by:
8. Name of accompanying Police Personnel:
9. Date and time of death:
10. Date and hour of receipt of
 - a. Dead body
 - b. Inquest papers
11. Date and hour of starting autopsy:
12. Date and hour of concluding autopsy:
13. Name of the Experts conducting autopsy:
 - a. Faculty
 - b. Residents:
14. Name of the Hospital: Maharajgunj Medical Campus
Institute of Medicine

RELEVANT DETAILS

Requisition letter from Metropolitan Police Circle, dated _____, with reference number _____ states that on _____ at _____ hours, the deceased

Cause of Death:

Signature of Medical Officer / Expert

Name:

Designation:

N.M.C. Reg. No.:

Date:

ANNEX B

EXTERNAL EXAMINATION:

1. **Length:** _____ inches
2. **Weight:** Not taken
3. **Physique:**
4. **Hair:**
 - a. Moustache
 - b. Beard
5. **Clothes and conditions:**

6. **Special identifying features (Huliya):-**

7. **Post-mortem changes:-**

- a. **Rigor mortis:**
- b. **Livor mortis:**
- c. **Algor mortis:**
- d. **Signs of decomposition:**

8. **Natural orifices:**

- a. **Eyes:** _____; **Pupils** _____ mm.
- b. **Mouth:** _____
- c. **Nose:** _____
- d. **Ears:** _____
- e. **Anus:** _____
- f. **Urethra:** _____

9. **Vagina:** _____

10. **Injuries:**

- a.
- b.
- c.
- d.
- e.
- f.
- g.

ANNEX B

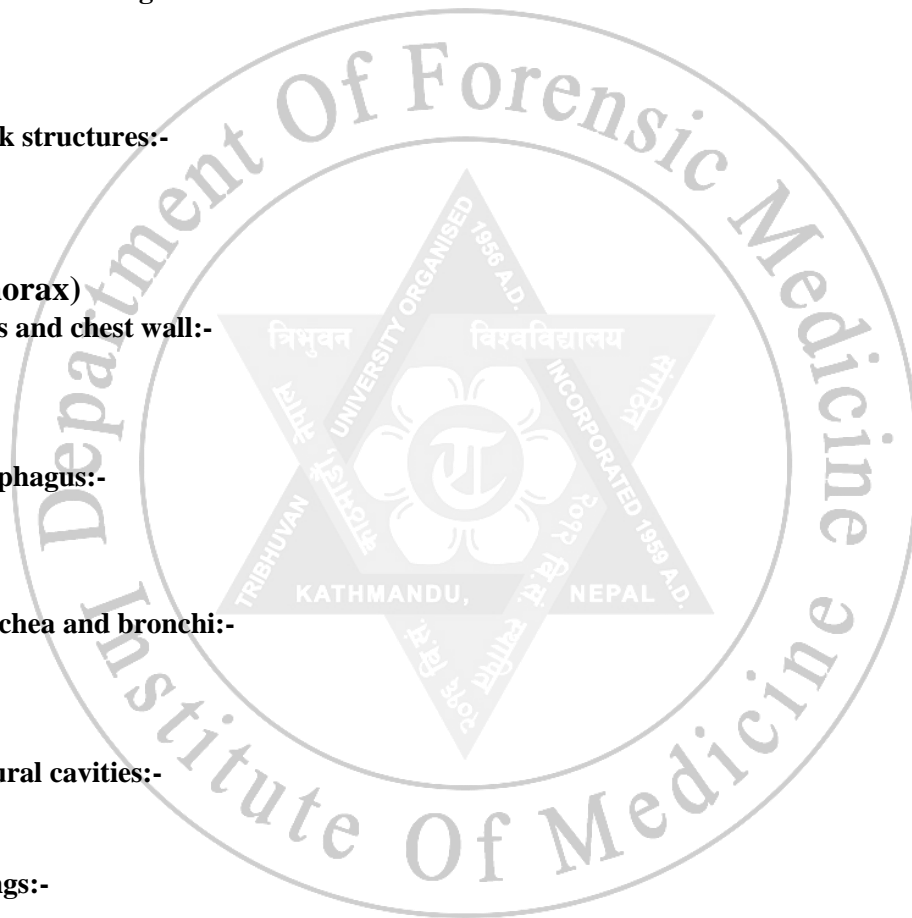
INTERNAL EXAMINATION

Head and Neck:

- 1) Scalp and skull:
- 2) Brain and vessels:-
- 3) Mouth and tongue:-
- 4) Neck structures:-

Chest (Thorax)

- 1) Ribs and chest wall:-
- 2) Esophagus:-
- 3) Trachea and bronchi:-
- 4) Pleural cavities:-
- 5) Lungs:-
- 6) Heart and pericardial sac
- 7) Diaphragm:-



ANNEX B

Abdomen

- 1) Peritoneal and Pelvic cavity :-
- 2) Stomach and content :-
- 3) Intestines :-
- 4) Liver, gall bladder and pancreas :-
- 5) Spleen :-
- 6) Kidney and renal pelvis :-
- 7) Genital organs :-
- 8) Urinary bladder and urethra: -
- 9) Spinal Column :-

Special Examination:

Specimen Collected For Analysis

Items Handed Over to:

Opinion or Conclusion

Cause of Death:

संभवभएसम्म मृत्युको कारण :

Signature of Medical Officer/Expert:

Name:

Designation:

N.M.C. Reg. No.:

Date:

Seal of the Hospital: