

NECROPSY

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PROF.DR. SEVİL ATALAY VURAL

What is a necropsy?



A necropsy, also called a post-mortem exam, is an examination of an animal after death. It is performed to obtain an accurate cause of death, and when done properly involves looking at the animal as a whole, as well as looking at each individual organ within the body. Careful examination and sampling of organs helps determine the cause of death, whether it is by disease or trauma.



- In order to investigate the cause of death and disease, it is called a **necropsy** to examine the organs and tissues of the cadaver within a method.

Necropsy = Autopsia

Although both terms have the same meaning, the autopsy is used in the field of human medicine as more people express the opening of the cadaver. Necropsy is a preferred term for veterinarians.

Purpose of Necropsy



Its main purpose is to reveal the cause of death and disease. For this purpose, the main reasons requiring necropsy can be grouped under the following headings:

1. To diagnose the disease, especially epidemic diseases, to reveal the cause of death,

2. To determine the accuracy of clinical diagnosis, to evaluate the effect and success of the treatment,

3. To evaluate the results of scientific research,

4. To check the structure and course (pathogenesis) of the disease,

5. Report to the insurance if the animal has died from the disease covered by insurance;

6. To report to the court in forensic cases.

GENERAL

NECROPSY
GENERAL
PROCEDURES
NECROPSY
PROCEDURES

Examination of the cadaver in each necropsy:

- 
- Location
 - Selection of tools
 - Starting with taking measures.

Then follow them **outside look** (general and private) and **inside**.



External Exam

It is examined in two groups as **General and Special**.

General Exam:

It is the external examination of the cadaver before opening the body cavities. Here:

- a. The identity of the animal (species, race, sex, age, special marks),
- b. Name and address of the owner, the organization to which the animal belongs and
- c. Anamnesis: Information on the cause of death and disease of the animal,

d. Body structure and general appearance of the carcass: Changes in the birth or later. Anomaly, wound, fracture, lack of a leg, such as body formation disorders,

e. Food status,

f. The position of the animal at the time of death (side, back position),

g. Death documents and the time of death are determined.

Special exam:

From the beginning of the cadaver, the region of the body and the extremities are examined externally.

Here:

- Especially the skin surface (skin and hair cover, belly, breast and external genital organs, horn, nail)
- The external mucosa and body holes (mouth, nose, ear, eye conjunctiva, anus, vagina) are examined.



Internal Exam

It is the removal of the internal organs and opening the body cavities of the cadaver, whose external examination has been completed.



*What are the methods of opening
and examining the cadaver?*



Methodic Procedure is revealed by Virchow. It is based on the removal of organs which are related **anatomically and functionally**. For example, the heart and lungs are removed together.

Holoptic Procedure is the examination of **the organs within a system**. For example, the lungs are examined with the upper airways, not with the heart as above.



GENERAL NECROPSY PROCEDURES

- The outside view is completed.
- It is determined that suspected disease is more frequently predicted and which organ or system to focus more on.
- Select the most suitable method for opening the body cavities and removing the organs.
- Start the necropsy.



Necropsis of large animals such as horses and cattle are made in place

The necropsy of foal, calf, small ruminant, cat and dog cadavers are performed on the necropsy table.

Each necropsy method:

I. Giving the necropsy position to the 1st cadaver

II. Skin exposure and separation of extremities

III. Opening the body cavities (opening of the abdomen, chest, and sometimes the pelvic cavities together or separately),

IV. Removal of neck organs

V. Separation of the head, opening of the cranium and removal of the brain, opening of the other cavities in the head (nasal cavity, sinuses, opening of the oral cavity if not opened), sometimes examination of the eyes and ears)

VI. M.spinalis

VII. It follows the order in which muscle, joint, bone, bone and other organs are separated and examined.

Necropsy Position

In the selection of position:



- The size of the animal.
- **Anatomical structure**
- **The purpose of necropsy** is important.

According to this, necropsy:

1. **Back position**
2. **Side position** was performed .

Back position

It is usually applied in small animals.

Advantages:

- It provides convenience in the work of the staff on the two sides of the cadaver.
- Prevents contamination and leakage of collected contents when body cavities are opened.

Side position

It is usually applied in large animals.

Advantages:

- It can be applied easily in areas where work area is narrow.
- It is suitable for single-sided studies with a person.

Skin Facing



The skin can also exposure in both positions of the cadaver.

However, the back position is more practical in total skin exposure.

a. In the ventral of the cranium, the symphysis on the skin is made a cross section extending from the mandible to the symphysis pelvis along the median line.

The point to be considered here is that the cross-section is always passed around the anus with the umbilical area, mammary gland and external genital organs.

In female dogs, the mammary gland passes through the middle as the breasts extend towards the chest.

Particularly in newborn animals, **septicemia related to omphalogen infections** should be intensified so that the umbilical cord should be examined as wide as possible.

b. Cross sections extending towards the feet are made along the medial face of each four extremities, intersecting the above first section.

This is followed by a cross-section of the extremities (mostly in the carpal, tarsal, or 2-3th phalanx joint). Then the skin of the extremities, dorsale (the animal's back) starting from the incisions and laterally swim. The head, neck and body skin is moved to two sides.

c. The skin of the neck region is separated from the first incision along the median line in the ventral to the dorsale and to the base of the ears.

d. The skin of the head skin, the skin around the mouth to stay in the cadaver is completely exposure. Ears remain on the skin that floats.

e. The body skin on the chest and abdominal cavity is also completed by the first incision in the mediastinum and the dorsal swim on the two sides.

During this process, the tail skin is not swollen to recognize the animal, it is left attached to the body.

1. Start a midline incision at the sternum and extend it to the symphysis of the mandible. Extend the incision from the sternum caudally to the groin above the umbilicus, mammary gland, or external male genitalia.

Lift the front leg and cut the muscle attachments close to thorax and lay the leg dorsally and flat. Reflect the skin dorsally from the midline incision of the neck to the base of the ear. Grasp the upper rear leg, incise the muscles, disarticulate the coxo-femoral joint. Reflect the abdominal skin dorsally from the midline incision to the transverse processes of the spinal column.

The upper legs (front and rear) and integument of the cadaver are reflected as one unit. Do not remove the legs from the cadaver or from the abdominal skin.

- **Ekstremitelerin Ayrılması**



a.Ön bacaklardan birisi el ile tutulup, biraz yana doğru açılır. Sağ eldeki bıçak yardımıyla, bacağın iç açısından (toraks ile skapula arasından) göğüse yakın yapılan kesitle bacak kassal bağlantılardan ayrılır. Aynı işlem diğer bacakta da tekrarlanır.

Then the leg is stretched sideways on the floor straight. The same procedure is repeated on the other leg.

The front left, front left, rear left and rear right legs are monitored during separation of the extremities.

Opening The Body Cavities



1. Opening the body cavities together
2. Opening the body cavities separate



Opening body cavities separate

In particular, it is preferred when there is liquid such as **transudate, exudate and blood** (hydrothorax, hemothorax, pyothorax, hydroperitoneum, hemoperitoneum) and **it** should be taken sterile without contamination.

In addition, if the animal is pregnant, neoplastic formation is detected in one of the cavities, and if the suspected disease is localized in one of the abdomen or chest cavity organs, it is advisable to open the cavities separately.



Separate opening of abdominal and thoracic cavities

Separate Opening of Abdominal Cavities



Back Position

With the help of a knife or scalpel, which is just behind the Cartilago xiphoidea, a few cm transverse section is made. The section's width is changed to size of animal. All the abdominal muscles to peritone are cut.

The left and middle fingers are inserted through this section. Under the guidance of the fingers, the abdominal wall muscles and the peritoneum are cut as paramedian along the linea alba to the pelvis, with the sharp side of the blade in the right hand, at a 45 degree angle.

The abdominal wall is stretched due to intravital or postmortal tympanie. In these cases, a more careful treatment is taken. Because the stomach and intestines filled with gas, rupture is possible at any moment.

After the above section, the first transversal section is made behind the sternum. The abdominal wall is cut through the right and left arch ribs to the vertebral column. In this way, the abdominal wall is separated symmetrically and the organs are exposed.




Opening the Thoracic Cavity

The muscles on the right and left sides of the chest are cut off. In order for the ventral and dorsal regions of the costa to be easily cut with a costotome, care is taken to thoroughly clean the muscles in the sternum and near the vertebral region.

The diaphragm is cut to the diameters of the crura diaphragma (with scissors or knife).



From the opened aperture thoracis cranialis, cavity organs are reviewed. In order to prevent the pericardium from being punctured when cutting the rib cage, the hand is inserted into the thoracic cavity and the connection of the pericardium with the sternum is severed from the front to the back. The thoracic cavity is cut.



The thoracic cavity is usually opened by cutting the ribs on both sides of the rib cage from the caudal to the cranial (from the last to the first costa), to the apertura thoracis cranialis.



But depending on whether the animal is large or small, young or old, the sections that are applied on the ribs are used both in different places and also in order to cut, either by using a costatom or knife.

- In order to provide a large working area in the chest cavity in older and large animals, the ribs on both sides of the rib cage are cut from the caudale to the cranial with a costatome close to the vertebral.

- This procedure is performed by cutting the ribs from the costochondral region in small animals such as cats and dogs.



- Since the ossification is not complete in young animals, the sternum is cut directly with a knife in the middle. However, in this case, a narrow space opens in the chest cavity and it is difficult to examine the cavity and remove the organs.

- Another method applied in animals of this age is as follows: The sternum is cut horizontally and the ribs are cut horizontally to the apertura thoracis cranialis.

Opening of the Thoracic and Abdominal Cavities Together



The opening of the thoracic and abdominal cavities together in the back position is similar to opening them separately in this position. In this respect, there is no difference in the places and directions where the sections pass.




Another Procedures on Opening of the Body Cavities

- I. Procedure

○ Where deemed
necessary:

- Cryptorchidism
- Herniated Hernia in Inguinal Canal
- Bleeding or infarction of the sperm canal due to improper castration

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- - The oral cavity is opened and the tongue, larynx, trachea, esophagus are freed up to Apertura thoracis cranialis.
 - - Starting from the abdominal cavity

II. Procedure

- The fact is that the chest cavity organs are taken out without cutting the rib cage after opening the abdominal cavity.
- In cases where there are no tools (costatoms, saws) to cut hands, they are applied in large bulky animals such as horses and cattle.

Application:

- A. The abdominal cavity opens in any position and the abdominal organs are taken out.

B. Diaphragm is removed according to known methods.



C. The neck organs are exposed and cut from the upper 1/3 of the tracheal and esophagus neck. The organs are pulled back and removed from the periphery.

D. A long blade from *A.toracis cranialis* is inserted and cut from the circumference of the esophagus around the trachea.

E. The cervical trachea and esophagus, which become free, are pushed through this opening into the thoracic cavity.

F. The left arm is inserted into the caudal side of the chest cavity and the organs are separated as a blunt.

G. The connection of the polycarium with the sternum is solved and the organs are pulled out.



Opening of the Pelvic Cavity

The pelvis cavity is opened to remove the rectum with the genital organs and urinary system organs. However, there is no obligation to open any necropsy such as the abdominal and thoracic cavity.

1. Opening the pelvis cavity by cutting the symphysis the pelvis



2. Opening the pelvic cavity with the sections passing from the foreman obturatum


1. Opening the pelvic cavity by cutting the symphysis pelvis:

The muscles are cleaned. The symphysis pelvis is cut from the pecten ossis pubis to arcus ischiadicus.



2. Opening the pelvic cavity with the sections passing from the foreman obturatum

The gap is narrow when the pelvic cavity is opened from symphysis pelvis. The examination and removal of organs in place, especially in large animals like horses and cattle, creates difficulties in the application of adult animals.



The symphysis pelvis is interrupted by passing a little right or left of the pelvis and parallel to it, centering the foramen obturatum.

According to the direction in which the animal lies, the upper of os ileum and os ischii are removed. Transverse cutting of the corpus ilia in front of the foramen obturatum-acetabulum / side position

Taking out the organs without cutting the pelvic bones:



It is applied when there is not any tool (chisel, saw).

Application:

- Urinary bladder in males; urinary bladder in female and uterus is held with left hand and pulled into the abdominal cavity.
- With a knife, the perimeter connections of the anus / vulva open to the ring and the organs are pulled by the abdominal cavity.



Opening the Oral Cavity
Removal of Tongue and Neck
Organs


At the Large Animals

Thoracic cavity organs of the trachea and the lower 2/3 of the esophagus after opening the thoracic cavity in large animals such as horses and cattle.

The upper 1/3 part is removed by leaving the body together.

Small Animals


Trachea and esophageal small animals (cat, dog, small ruminant etc.) are removed with other organs such as chest cavity organs (lungs, heart) tongue, larynx, tonsils, thyroid, parathyroid and their associated lymph nodes. After the thoracic cavity is opened, removal of said organs starts by opening the oral cavity and removing the tongue. It follows the removal of the neck organs.



A. Open the oral cavity by removing the mandible on the top and removal of the tongue

- **The muscles are cleaned and the symphysis mandible is cut off.**

- **The remaining top ramus is turned back and rotated by holding the mandible.**



B. Open the oral cavity by cutting a portion of the mandible on the top

- **Masseter muscles are cleaned.**
- **The upper corpus mandible is cut in front of the premolars and the mandibular joint is cut in close proximity.**



A. Mandible is no cut

1. Spatium on both sides of the mandible, the ramus mandibulae starting from the caudal edges of the ends of the symfysis mandibula in a section is made.



2. Once the frenulum lingua has been cut, the tongue that is free is removed by the left hand and the tongue is pulled up and back from the spathium mandible.



- After separation from the hyoid bone with a costatome, it is taken out from the cadaver with the larynx as above.



Head separation from cadaver

a. The head is positioned so that the ventral side of the neck and the chin is at the top. In this case, the lower part of the atlanto-occipital joint also overlaps.

b. Left hand by pressing under the chin and pressing the head backwards.



- With the right hand knife, the surrounding tissues of the atlanto-occipital joint are cut. Following this, joints and M. spinalis are cut with a knife and the joint is separated from the joint by stretching.





- Then, head is separated from the neck by cutting the tissues at the dorsal (dorsal side) of the joint .



In some cases spinal fluid should be examined.
In this case, spinal fluid is taken for
microbiological and biochemical examination
without leaving the head.

- For this procedure: a deep section is made on the foramen magnum from the region behind the corners of the mandible, which corresponds to the rear edge of the condylus occipital. Spinal fluid is drawn through an injector.



The spinal fluid can also be removed during the separation of the atlanto-occipital joint. The cerebrospinal fluid can also be removed from the dorsal portion of the atlanto-occipital joint (by the neck). According to this, the muscles between the neck and head lig. The nuchae and other connections are transected from the dorsal to the atlanto-occipital insert, and the area is cleared.

- The head leans forward. The dorsal space of the atlanto-occipital joint (spatium atlanto-occipitalis) is well opened. The needle of the syringe is inserted into the subarachnoidal cavity from the atlanto-occipitalis and the fluid is drawn.



Cranium Opening



During the opening of the skull, the head is held by an assistant to prevent it from shifting to the right or left, or is clamped to the clamp. The surface of this process is easier to do on a spiked metal table.

a. If the skin is still not remove, the skin is extirpated.

b. In order to prevent the muscle parts from entering between the saw teeth and making the cutting difficult, the muscles on the skull and the sides (temporal, especially fossa temporalists) are cut and the area is cleaned.

First, a transversal section is made to the skull to pass through the processus zygomaticus of the os frontale.

It is important to make sure that this section is made in the most domed area of the os zygomaticus immediately after the lateral eye angles.

The skull of the long-nosed dogs is 3 cm.
should be cut until aboral.




Otherwise, either the brain is cut or the cavum
cranium is not opened .

- The second and third sections pass through the sides. For this purpose, on the one side of the skull (right or left) and on the side of condylus occipitalis (dorso-medial); the second section is made, starting with the foramen occipitale magnum and joining the end of the first transversal section. This also follows the third section repeated on the other side.

Finally, between the sections made with the saw, the knife's back is inserted and the lever movement is made and the bone piece (calvarium) that covers the lid-shaped space is moved away.

In addition to these, a further section 4 is made at the cattle. This first transversal section begins at the midpoint of the middle of the region between the horns are passed through the foramen occipitale magnum.





Then, the horns that are struck by the horns or the hands held with the horns are pressed in the latero-ventral direction or removed from the sections with the help of chisel and hammer and the calvarium is removed.