

**Ministry of Health of Ukraine  
National Medical University Named after O.O. Bohomolets  
Department of Forensic Medicine and Medical Law**

**N.M. ERHARD**

## **Forensic Examination of a Mechanical Asphyxia**

*Methodologic materials*





**Educational edition**

**ERHARD Natalia Mykolaivna**

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Author's edition

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04114, м. Київ-114, вул. Автозаводська, 78

Адреса редакції та п/п: інформаційно-видавничий відділ УкрДГРІ  
04114, м. Київ-114, вул. Автозаводська, 78  
Тел.: 206-35-18; тел./факс: 430-41-76  
E-mail: mru@ukrdgri.gov.ua

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**KYIV-2019**

Agreed and amended by the department of forensic medicine and medical law of the National Medical University of Ukraine named after O.O. Bohomolets (Protocol № 12 from 25.01.2019).

**ERHARD N.M.** Forensic Examination of a Mechanical Asphyxia – Methodologic materials. – K.: UkrSGRI, 2019. – 24 p.

These methodologic materials contain tasks for a practical class in English, based on a competent approach with students of higher medical and justice education institutions with III-IV level of accreditation.

These methodologic recommendations can be of use for medical workers, employees of all entities of Ministry of Internal Affairs, students, interns, teaching professors of higher medical and justice educational institutions.





## List of literature

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9. Михайличенко Б.В. Судово-медичне визначення ступеня тяжкості тілесних ушкоджень потерпілих, звинувачених та інших осіб / Б.В. Михайличенко, Н.М. Ергард. – К.: УкрДГРІ, 2017. – 24 с.
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## I. Forensic Examination of a Mechanical Asphyxia

**Task № 1.** Provide definitions:

Hangings –....

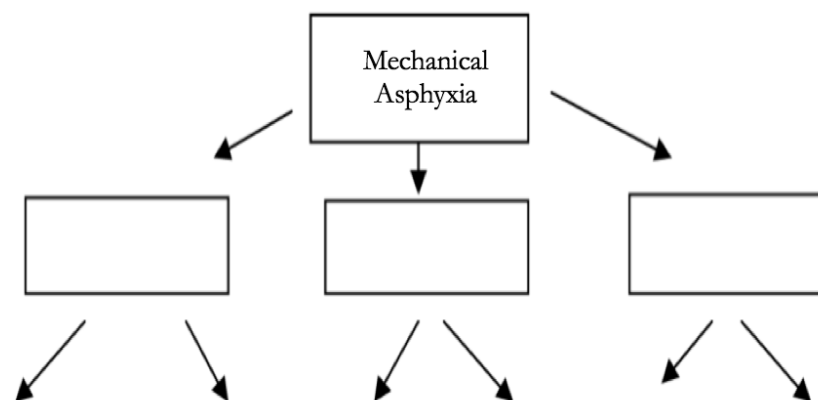
Ligature strangling –....

Airways obstruction with foreign bodies –....

Compressive Asphyxia –....

drowning –....

**Task № 2.** Complete a diagram by adding to classification of Mechanical Asphyxia:



**Task № 3.** Fill the table with Asphyxia's development stages:

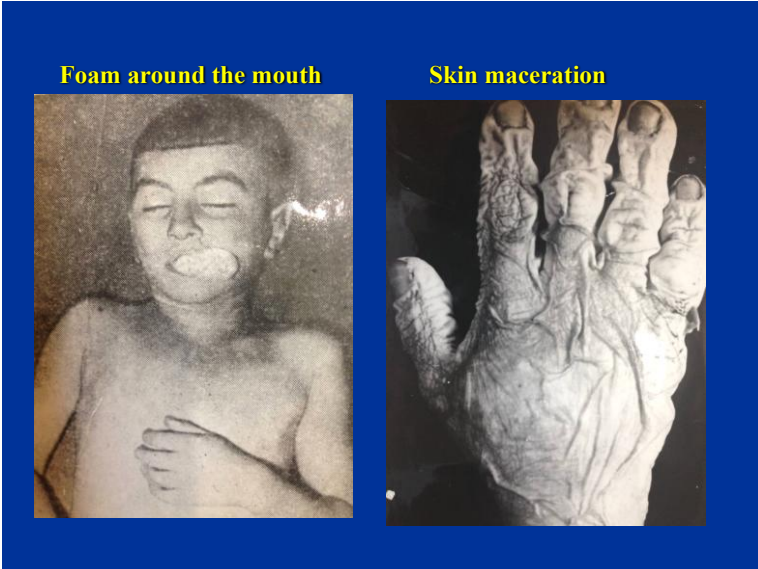
Stage	Pathogenesis
I	
II	
III	
IV	

**Task № 4.** Fill the table by adding General external/internal signs of Asphyxiation:

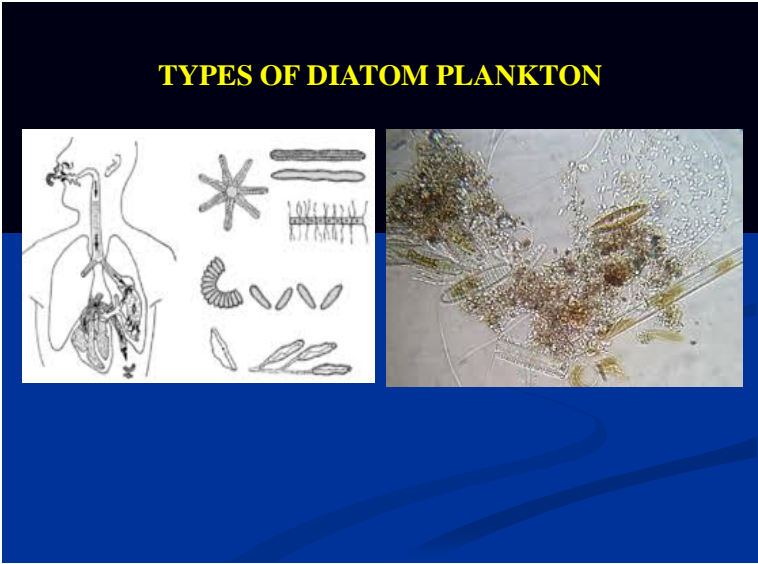
External signs	Internal signs







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Pic. 1.



Pic. 2.

**Task № 6.** Based on pics. (3,4) provided below define and explain the type of Mechanical Asphyxia:



Pic. 3



Pic. 4

**Task № 7** List specific signs related to Mechanical Asphyxia caused by chest/abdomen compression:

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

**Task № 8.** Dill the table with signs of drowning and signs a body being in the water:

Body being in the water	Signs of drowning

II. Example of a PowerPoint presentation for the class

National medical university named after O.O. Bohomolets  
Department of Forensic Medicine and Medical Law


**FORENSIC EXAMINATION OF A  
MECHANICAL ASPHYXIA**

Assistant professor of Forensic  
Medicine and Medical Law  
Department, MD, PhD  
**Erhard Natalia Mykolayivna**

Slide 1

**MECHANICAL ASPHYXIA**

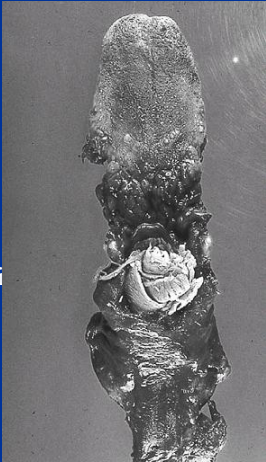
*Mechanical Asphyxia*— is a condition of severely deficient supply of oxygen to the body and a rapid accumulation of a carbon dioxide, that happens due to an external mechanical barrier for an air flow through airways



Slide 2

**Airways obstruction by foreign bodies**

1. General asphyxiation signs
2. Specific signs:
  - foreign bodies on the mucous layer of airways (trachea, bronchi)
  - small hemorrhages on the mucus lining of airways (trachea, bronchi)



Slide 19

**Drowning**

1. Signs of a body that been in the water
  - wet clothes, wet hair, skin maceration, diatomic plankton in lungs and in the stomach
2. Signs of drowning:
  - presence of a foreign body on the airways' mucus membrane (trachea, bronchi)
  - presence of small hemorrhages on the airways' mucus membrane (trachea, bronchi) under the foreign body
  - diatom plankton in kidneys and bone marrow

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## Characteristics of a ligature mark in hanging and ligature strangulation



Slide 17

## Types of Mechanical Asphyxia

### I. Neck's organs compression

#### 1. Strangling Mechanical Asphyxia

- a) Hanging
- b) Ligature strangulation

#### 2. Manual strangulation

Slide 3

## Defining whether hanging occurred while person is alive

### Signs that ligature marks were obtained while patient is alive:

- hemorrhage in mark's lining
- bones and cartilages fracture
- damage to arteries
- plethoric skin's blood vessels on the marginal and intermediate skin folds
- swelling of the derma and etc.

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## II. OBSTRUCTIVE MECHANICAL ASPHYXIA

- 1. Airways obstruction by a foreign body

## III. ASPIRATION ASPHYXIA

- 1. Drowning
- 2. Aspiration by vomit



Slide 4

#### IV. Compressive Mechanical Asphyxia

##### 1) Chest and abdomen compression



Slide 5

#### Manual strangulation

1. General signs of asphyxiation



2. Specific signs:

-half-moon bruises around the neck

-fracture of larynx' s cartilages and hyoid fracture



Slide 15

#### Stages of Mechanical Asphyxia development

- Preasphixiation stage
- Inspiratory dyspnea (ins. shortness of breath)
- Expiratory dyspnea (exp. shortness of breath)
- Resting stage
- Gaspings
- Persistent apnea

Slide 6

#### Ligature strangulation

1. General signs of asphyxiation

2. Specific sign:

-horizontal ligature mark, made into a full circle, placed on the same level or below cricoid cartilage



Slide 16



## Signs of Hanging

1. General signs of asphyxiation

2. Specific signs:

- oblique-ascending ligature mark

- Amussat's sign

- Walcher's sign



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## Forensic diagnostic of Mechanical asphyxia

1. General asphyxiation signs of a mechanical asphyxia

1.1. External signs

1.2. Internal signs

2. Specific signs of hanging

2.1. External signs

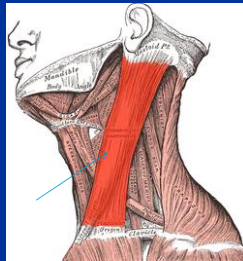
2.2. Internal signs

Slide 7

## Internal types of signs of Hanging



Rupture of an intima layer of carotid artery (Amussat's sign)



Hemorrhage into nodding muscles (Walcher's sign)

Slide 14

## General external asphyxiation signs

1. Cyanotic face (blue face)

2. Subconjunctival hemorrhage (a)

3. Livor mortis of dark-purple color (b)

4. Sphincters paresis



a



b

Slide 8

### General internal signs of a mechanical asphyxiation

1. Liquid dark-red blood
2. Right heart chambers are filled with blood
3. Plethoric internal organs
5. Tardieu spots (a, b)



a



b

Slide 9

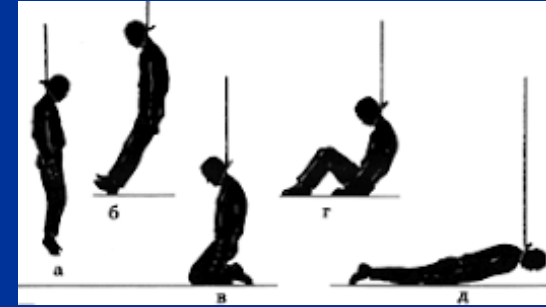


6. Vesicular emphysema

Slide 10

### Hanging

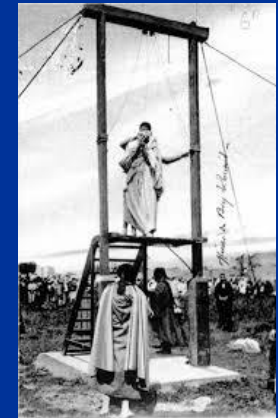
**Hanging**– is a type of a mechanical asphyxia, when a person is suspended by ligature around the neck getting tighter under the weight of a full body or a part of a body of a person.



Slide 11

### Mechanism of death in Hanging

- Trachea's lumen blockage by tongue's root
- Jugular veins compression by the ligature
- Vague nerve trunk's compression which creates a reflex and heart stops
- Disruption of a spinal cord in neck vertebrae



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