



ВОЛГОГРАДСКИЙ  
ГОСУДАРСТВЕННЫЙ  
МЕДИЦИНСКИЙ  
УНИВЕРСИТЕТ

# Clinical anatomy. Clinical anatomy of the head and the neck. (Introduction to the discipline)

The team of the department for operative surgery and topographic anatomy VSMU

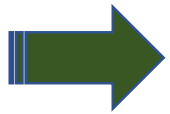
# INTRODUCTION



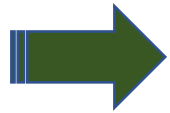
The outline:

1. The definition of the concept «clinical anatomy» & «surgery».
2. The history of creating surgery at large and the department of operative surgery and topographical anatomy of the Volgograd State Medical University in particular.
3. The concept «surgical operation» and the classification of operations and their basic stages.

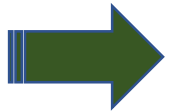
# There are three main approaches to study human gross anatomy:



SYSTEMIC



SURFACE



REGIONAL

# The main approaches in anatomy



- **Systemic anatomy** is an approach to anatomical study organized by *organ systems* that work together to carry out complex functions. None of the organ systems functions in isolation. For example, much of the skeletal, articular, and muscular systems constitute the *locomotor system*. And although the structures directly responsible for locomotion are the muscles, bones, joints, and ligaments, other systems are involved as well. The arteries and veins of the circulatory system supply oxygen to them and remove waste from them and the nerves of the nervous system stimulate them to act.

# The main approaches in anatomy



- **Surface anatomy** is an essential part of the regional approach, providing a knowledge of what structures are visible and/or palpable (perceptible to touch) in the living body at rest and in action. The physical examination of patients is the clinical extension of surface anatomy. In people with stab wounds, for example, the healthcare worker must be able to visualize the deep structures that might be injured.

# The main approaches in anatomy



- **Regional anatomy** is based on the organization of the body into parts: head, neck, trunk (further subdivided into thorax, abdomen, pelvis/perineum, and back), and paired upper and lower limbs. Emphasis is placed on the relationships of various systemic structures (e.g., muscles, nerves, and arteries) within the region. Each region is not an isolated part and must be put into the context of adjacent regions and of the body as a whole.

# Clinical anatomy

emphasizes aspects of the structure and function of the body important in the practice of medicine, dentistry, and the allied health sciences. It encompasses both the regional and the systemic approaches to studying anatomy and stresses clinical application.

# DEFINITIONS

**Topographical anatomy is a doctrine about the collocation and interrelation of organs and tissues according to the regions of a human body.**

It received its name from Greek words “topos” (place) and “grapho” (I write), hence topographical or surgical anatomy. But it is quite possible that the former name of the subject (clinical anatomy or surgical anatomy) reflected the above mentioned sense better.



Topographical anatomy studies the collocation of organs as applied to a particular region and, thus, helps a surgeon orient himself in an operational wound. However, topographical anatomy is not an applied kind of science only for surgery; it forms the basis for widely spread common medical methods of topical diagnostics (palpation, percussion, auscultation and radioscopy) and for set of other tool methods of research.

The famous scholar *Efim Osipovich Muhin, N.I. Pirogov*'s teacher, told that the doctor, who does not have knowledge of anatomy, is not only useless, but also dangerous for a patient. 100 years later, the outstanding Moscow obstetrician-gynecologist *A.P. Gubarev* managed to characterize this truth quite precisely: «*Without knowledge of topographical anatomy there can be neither a surgeon, nor a therapist, but only signs and prejudices*».

# DEFINITIONS

**Operative surgery** - the doctrine of surgical operations, the rules and methods of their implementation.

**Surgical operation** - a mechanical influence on tissues and organs of a patient by the hands of a surgeon, armed with instruments, carried out for medical or diagnostic purposes.

# PRINCIPLES OF OPERATIVE SURGERY

Because of this, in order to avoid such situations the well-known surgeon *N.N. Burdenko* recommended, while performing an operation, to be guided by the triad determining the actions of a surgeon, namely:

- Anatomical availability
- Technical opportunity
- Physiological permission



Surgery is a divine art, the subject  
of which is a beautiful and  
sacred human image.

*Goethe.*



**Sisters of Charity at the Port-Royal-Des-Champs Hospital.** Artist Madeleine de Bolognay, 1656 *National Library, Paris*



The term «surgery» was firstly introduced by *Avl Carnelius Celcius*. It derived from Latin words «chier» means hand and «ergon» - to work. Much later, already in the Middle Ages, all people, respected to medicine, were divided into 5 groups.



## Aulus Cornelius Celsus

Element of the frontispiece  
from the treatise “Art”  
translated from Latin into  
French in 1765. Volumes 6-  
12 of this treatise are devoted  
to medicine, and surgery in  
particular

*National Library of Medicine.  
Bethesda. USA*







- 1 group - **Doctors of medicine**, who studied it at universities. They were able to treat internal diseases, wrote out the prescriptions, gave an enema to patients, flushed a stomach, etc.



## Doctor's visit

Hood. Franz Van Meyers

*Museum of Art History.  
Vein. Austria*





- 2 group - **Surgeons**, who had no higher education, and that`s why were not allowed to write out any prescriptions, but still made phlebotomy (blood-letting) and lithotomy, and for their own advertisement used bones painted in yellow colour.



**Engravings by Martin Engelbrecht** «The Court Surgeon» and «The Surgeon's Wife», 1624 *Louvre, Paris. France*



## Removing the stone of stupidity

Artist Hieronymus Bosch

*(wood, oil. 48x35cm. Prado Museum. Madrid, Spain)*





**Surgeon.** Artist Jan Sanders Van Hemessen, 1575 *Prado Museum. Madrid. Spain.*



- 3 group - **Barbers**, who shaved clients and cut their hair, could start up a blood and make small operations.



## Barber

Color illustration for the manuscript of Jacobus de Kessolis. About 1408

*Library of the University of  
Prague*







## **Barber and peasant**

Engraving by artist Lucas  
Van Leyden 1524

*Rijksmuseum, Amsterdam,  
Holland.*



## Barber

Engraving by Lucas Van  
Leyden. 1523

*Rijksmuseum. Amsterdam,  
Holland*



- 4 group - **Bath-house attendants**, who experts in the field of external diseases, especially, dermal ones.



**The medicine man.** Artist. David Rickert 3. (1638, *State Museum of Fine Arts, Valencia, France*)



- 5 group - **Frauds (charlatans)**, who treated various wounds, usually with the help of worms, rubbed together with other drugs. Thus, from the ancient times surgeons were considered to be the isolated caste of doctors.



## Village charlatan

Artist Adrian Brouwer 1636

*State Institute of Arts,  
Frankfurt am Main,  
Germany*



**Visiting doctors.** Artist D. Heemskerck, 1650 *Rijksmuseum. Amsterdam.*  
*Holland*

# The stages in the development of surgery



It is possible to point out 4 basic stages in the development of surgery:

- **The first period** – the empirical one, dated from the ancient times up to the second half of the 19<sup>th</sup> century before discovering narcosis, antisepsis, asepsis.

One typical thing of this period is that almost all operations were carried out empirically, intuitively, without any legible scientific substantiation.





**Anubis removes the  
viscera of the deceased  
to perform the ritual of  
resurrection**

XIII century BC

*Thebes, Valley of the  
Kings. Egypt*





## **Surgery on male genitalia – circumcision? castration?**

**(X century BC. Wall of  
Sakkara. Egypt).**





## Image of Hesi-Ra - architect, surgeon, dentist

(XVIII century BC, Sakarra,  
Egypt).





**Imhotep** - ancient Egyptian physician, priest, vizier



**Fragment of a set of surgical instruments from the temple of Koma  
Ombos (XI century BC. Egypt)**

Nobody knows who was the first surgeon and when it happened: whether he was the ancient Indian barber, who 1000 years B.C. carried out a rhinoplasty during intervals between hairstyling and shaving; or the ancient Egypt priest, who had a knowledge of producing craniotomy and managed to conceal the defect in the skull of a pharaoh by means of a gold plate, or may be it was our ancestor, who is depicted on the surface of a silver Scythian cup, found not far from Volgograd, taking out an arrow from the body of his wounded comrade; or whether it even was the Catholic monk, who as inheritance left three huge chests with 300 thousand dens in there, the majority of which after checking were claimed to be able-bodied.



## Seated Asclepius

(Relief from the Temple of Asclepius - Asklepeion in Epidaurus. Around 380 BC, one of the oldest and most reliable images of the healing god).



## Sanctuary of Asclepius at Epidaurus



Ancient surgical instruments found during excavations at Epidaurus





## **Achilles removes the spear from Odysseus's body**

**Bas-relief from  
Gurkulanum.**

*National Museum of  
Archaeology, Naples,  
Italy.*





## **Achilles provides surgical assistance to the wounded Telephus**

Fresco from Pompeii

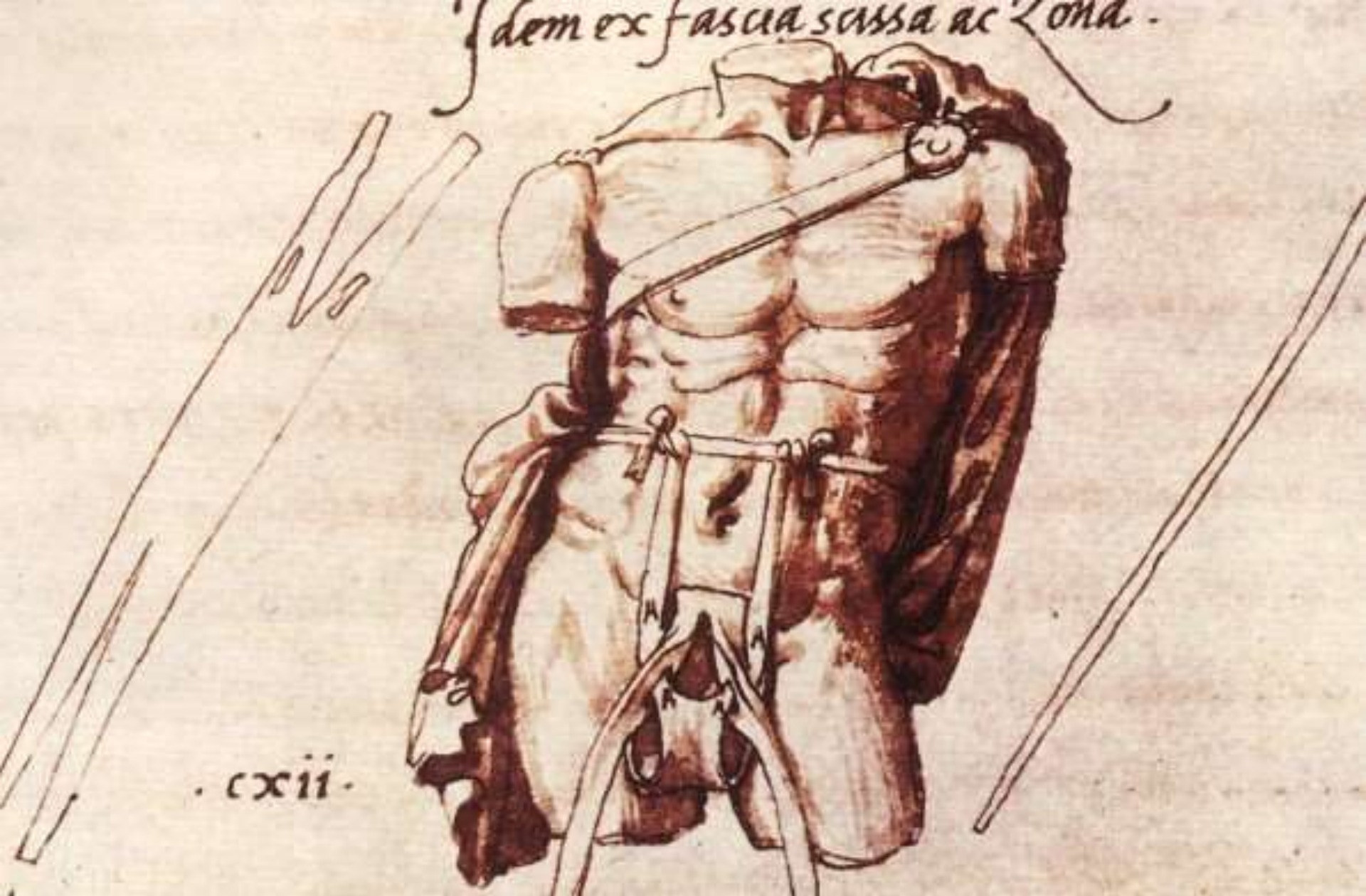
*National Museum of  
Archaeology, Naples, Italy.*





**Hippocrates and Galen.** A XVI century miniature illustrates the interconnectedness of the medical concepts of these great physicians and shows the extraordinary longevity of their teachings.

*National Library of Medicine, Paris, France*



**Applying a support bandage - a suspensory - to the scrotum.** Woodcut from the book of Guido Guidi, who translated the works of Hippocrates into Latin. Artist. Primatizio, 1540

*National Library, Paris, France.*



## Education surgery on corpse

III-IV century. Painting of the polygonal hall of the hypogeum on Via Dina Compagno in Rome



There is a popular saying about surgeons «*He is a God`s doctor*», and it is also supposed that this expression belonged to the saints Cosma and Demian, who are considered to be the patrons of surgery.



## Saints Cosmas and Damian transplant a patient's leg

Artist. Fernando del Rinconi

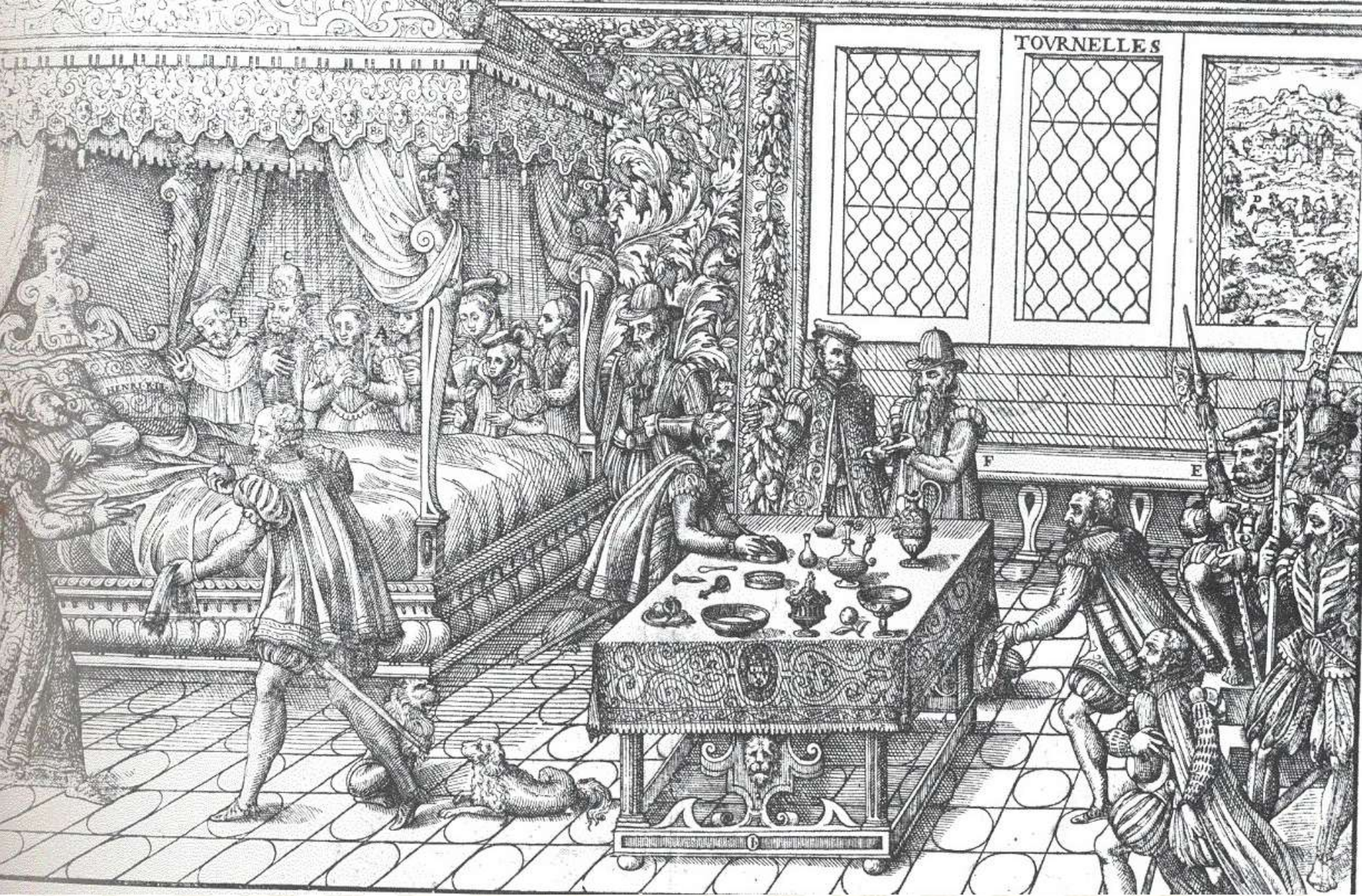
*Prado Museum, Madrid,  
Spain*





**Execution of Saints Cosmas and Damian.** Artist Fra Giovanni Angelico (1438 - 1440. Part of the large altar. Church of San Marco. Florence. Italy).

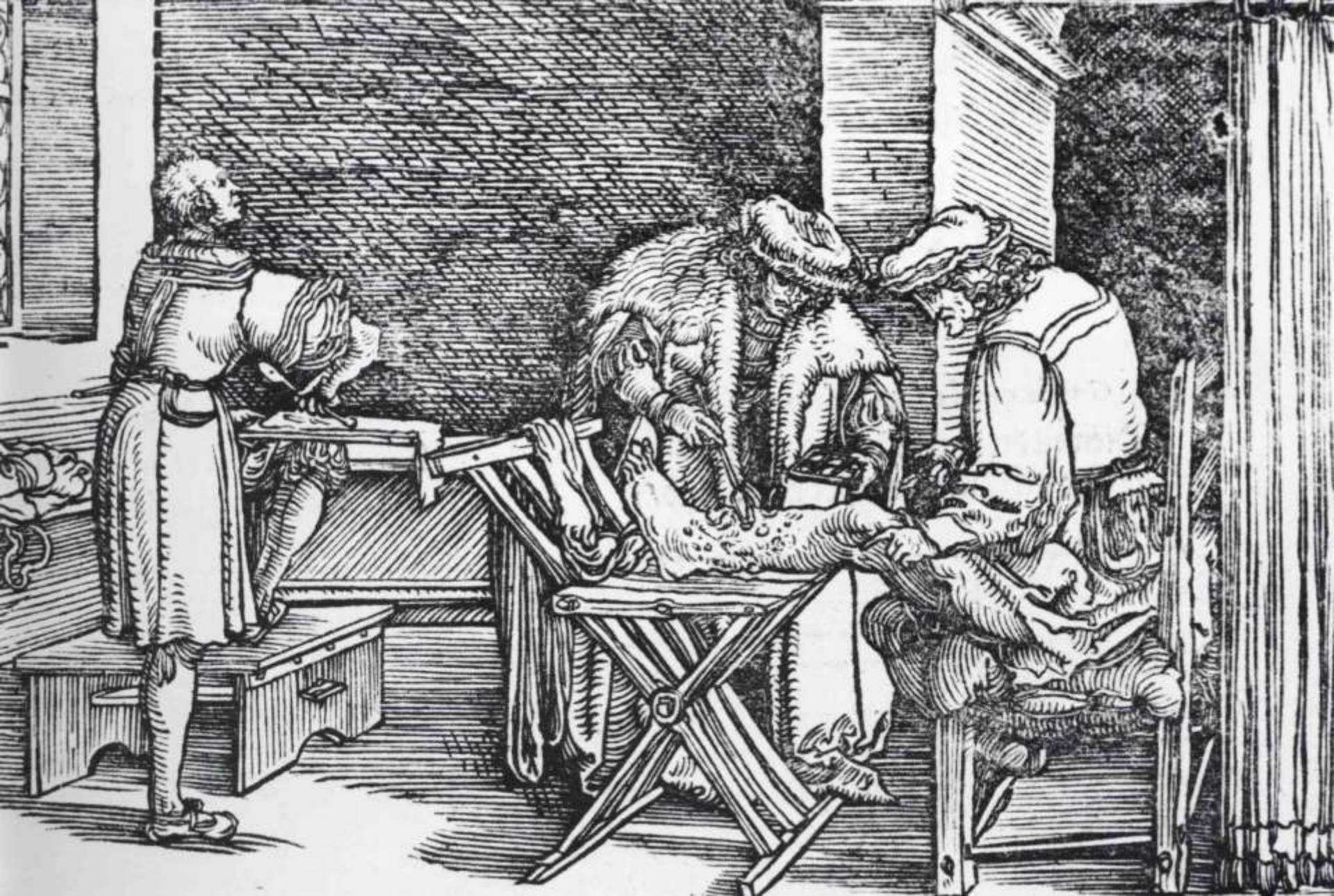




**Ambroise Paré (left) and Andrew Vesalius (right) at the bedside of the dying King Henry II, mortally wounded at a knightly tournament. (Woodcut, XVI century, National Library of Medicine, Bethesda)**



**General view of a medieval Italian hospital Unknown artist, 1410**



**Treatment of leg ulcers by cauterization**, woodcut from *Trost Spiegel in Gluck und Ungluck* (1572, National Library of Medicine, Bethesda, USA).

# The stages in the development of surgery



- **The. second period** – the basic one, dated from the middle of the XIX century up to the 20-s of the XX century. At that time the feudal system was replaced by the capitalism and new industrial relations were developing. In the field of science there was also made a rapid jump.



**The first public demonstration of modern anaesthesia 16 October 1846 Boston, MA, USA**

Thanks to the discoveries of chemists and biologists, narcosis, antiseptics and asepsis, on which the modern surgery is based on, were invented. Exactly in this period the basis of topographical anatomy was based: it was *N.I. Pirogov*, who firstly introduced this science for a substantiation of surgical operations. He named it «surgical anatomy», as the main aspiration of his researches was study the collocation of organs and tissues in a wound at performing various surgical operations. *N.I. Pirogov* carried out into effect a unique in volume anatomical experiment for studying the topography of tissues and organs with the help of cutting frozen corps, which received the name of «*ice anatomy*».



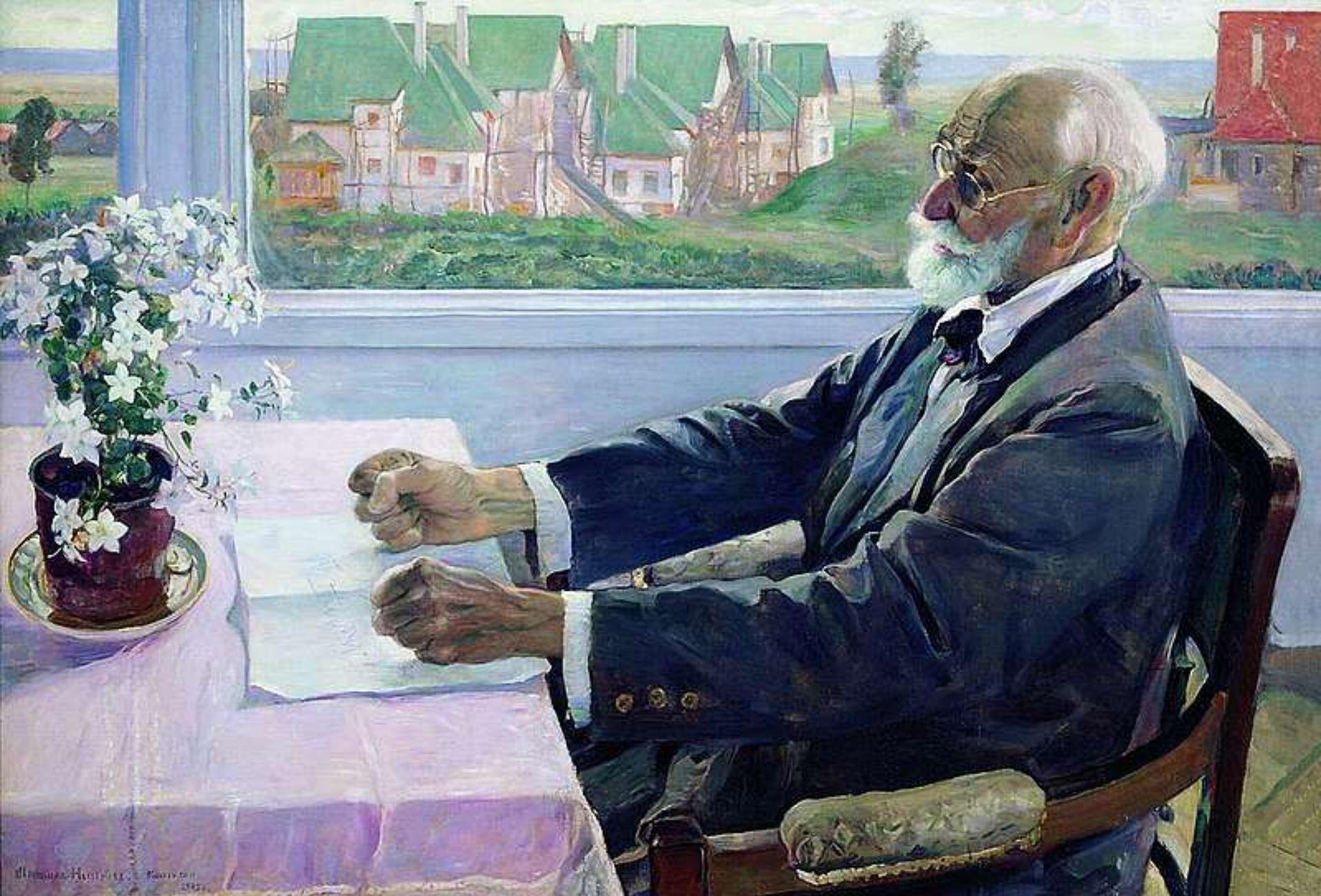
**N.I. Pirogov during the war in the Caucasus**

# The stages in the development of surgery



- **The third period** – the physiological-experimental one, dated from 20-s up to 50-s of the past century. It was greatly influenced on by the works of the Nobel Prize Winner *I.P. Pavlov*. In this period surgery got too closely bounded by its usual frameworks and therefore all amassed knowledge was transformed into independent disciplines such as anaesthesiology, reanimatology, urinology, neurosurgery etc. During this period our subject alongside with the study of topographical anatomy was enlarged in the field of experiments upon animals.





**Portrait of Ivan Pavlov painting by Mikhail Nesterov**

The motto of the surgeons of the 1950-s «*A path to clinic lays through experiment*» is quite actual even nowadays. In a number of cities of the Russian Federation and abroad the departments of operative surgery and topographical anatomy bear the name of the department of experimental surgery, since this is the place where all procedures and receptions of future operations are fulfilled.

# The stages in the development of surgery



- **The fourth period** – the modern one or the period of reconstructive surgery characterized by the profound scientific search of new ideas and the development of the methods of diagnostics and treatment of the basic fundamental achievements of this science.



# Robotic surgery

## The history of the faculty for operative surgery and topographic anatomy of Volgograd State Medical University



It was founded in 1938 and its head was professor *M.K. Rodionov*, who made a vital contribution to studying surgical aspects of the biliary system. Being an outstanding surgeon, who had passed through the hospitals of the Second World War, he was one of the first people in the city who began to operate patients with suppurative diseases of lungs.

# The history of the faculty for operative surgery and topographic anatomy of Volgograd State Medical University



Since 1963, after *M.K. Rodionov*'s death, the faculty was taken over and managed by the professor *A.G. Konevsky* up to 1988. He was one of the first in the Soviet Union who was engaged in transplanting organs and tissues. His film, the main hero of which was a two-headed dog, became a great success and managed to go round the whole world. It should be also mentioned that owing to his invented method of seamless bond of vessels, the technique of transplanting kidneys and heart was considerably simplified. On the way of solving problem of transplantation there was created the telemetric system «Koviyl» for transferring an ECG to distance with subsequent qualified decoding it at the cardiocenter of Volgograd Regional Clinical Hospital.

## The history of the faculty for operative surgery and topographic anatomy of Volgograd State Medical University



Since 1988 up to 1991 the faculty was managed by the professor *A.G. Beburishvili*, who, alongside with an excellent knowledge of camera art, made a great contribution to surgery of liver and was the first to found a laparoscopic surgery in our city.

## The history of the faculty for operative surgery and topographic anatomy of Volgograd State Medical University



Since 1992 the faculty has been managing by professor A.A. *Vorobyov*, who nowadays can already be called the founder of a brand new fundamental approach in the field of experimental medicine: he is considered to be the author of numerous original operations upon animals. Professor Vorobiev is the author of a unique invention - the passive exoskeleton EXAR-34, which helps restore lost limb functions to patients with a wide range of pathologies of the musculoskeletal system.



## CLASSIFICATION OF OPERATIONS

**I.** 1) bloody; 2) bloodless (dislocation reduction, some types of endoscopic interventions);

**II.** **By stage:** 1) one-stage; 2) two-stage; 3) multi-stage;

**III.** 1) primary; 2) repeated;

**IV.** **The timing of the:**

1) **Emergency** -operations that cannot be postponed for any period without endangering the patient's life and / or health;

2) **Urgent** - operations that can be postponed for a short time to clarify the diagnosis, or prepare the patient;

3) **Deferred**

4) **Scheduled (planned)** operations - operations that can be postponed indefinitely without endangering the patient's life and / or health.

# CLASSIFICATION OF OPERATIONS

**V. for the purpose of:** 1) therapeutic; 2) diagnostic; 3) therapeutic and diagnostic; 4) aesthetic.

**VI.** 1) **radical** – complete removal of the pathological focus (tumor);

2) **palliative** – maximum removal of the pathological focus (tumor);

3) **symptomatic** – aimed at eliminating complications of the disease, the purpose of which is to reduce the risk to life and improve the quality of life of the patient.

**VII.** 1) **combined** – in different areas of the body; 2) **simultaneous** – in one area of the body (cavity).

# CLASSIFICATION OF OPERATIONS

**VIII. By body area:** 1) cardiovascular, 2) abdominal, 3) orthopedic, etc.

**IX. By type:**

- 1) *Amputation* -removal of a part of the body, usually a limb or finger with a bone cut;
- 2) *Exarticulation* - removal of a part of the body, a limb by separating the joint;
- 3) *Resection* - removal of the entire internal organ, its key part (lobe, segment) or such part that has its own name;
- 4) *Replantation* –
- 5) *Reconstruction of* -
- 6) *Excision* –
- 7) *Transplantation* –



*I.P. Pavlov* used to say that doctor is originally a mechanic of human body and his initial mission is to learn how to repair this mechanism. And while speaking of such mechanics of human body we should first of all refer to surgeons. But it is also necessary to mention that the hands of a surgeon can affect not only the life, but the death of a patient as well, that is why in the history of surgery we have several cases when surgeons committed suicides after having made unsuccessful operations.

## **Each operation has 3 stages:**

- A) **Operative access** – a part of the operation that provides the surgeon with an organ exposure.
- B) **Operative reception** – the main part of the operation on the affected organ.
- C) **Completing (exiting) the operation**

When speaking about «operative access», we mean a place on the skin, where a cut is made. The operative access should be of small traumatism and must provide some open space for a lumen of a wound. At making a choice of the operative access needed, a surgeon must define the shortest possible path to internal organs, but, however, the shortest path is not always the best one, since a scalpel of a surgeon may face vitally important organs standing in its way. The operative access is worked out judging by the topographic anatomical peculiarities of the given region.

As for the dimensions of the operative access, it is in each case up to a surgeon to decide how to make it. In fact, it all depends on the qualification of a surgeon: an experienced one will never operate within a small cut, since the last reduces availability. And there is even a saying “the bigger a surgeon, the bigger a cut”. Moreover at purulent operations small cuts are even harmful, because they do not provide any sufficient drainage of a wound. But at the same time those ones which are too big can cause an additional trauma, deteriorate the cosmetic affect and frequently become the reason for hernia. That is why, when deciding which cut to make, one should always refer to the rule of the golden mean.

At planning a cut, it is also essential to take into consideration the thickness of a hypodermic fatty cellular tissue, the depth of location of an operated object, and also the amount of manipulations needed. It is also important to mention that when choosing the operative access, it will be more desirable to avoid any intersections with vessels and nerves. At last we come over to the third stage of an operation-its completion. But, at first, we will touch upon several things which are necessary for you to understand, such as, all the tissues should be sutured layer for layer: skin with skin, muscle with muscle, fascia with fascia.



# SURGICAL INSTRUMENTS



**Surgical instruments** are specially designed tools that assist health care professionals carry out specific actions during an operation. Most instruments crafted from the early XIX century on are made from durable stainless steel. Some are designed for **general use**, and others for **specific procedures**. There are many surgical instruments available for almost any specialization in medicine. There are precision instruments used in microsurgery, ophthalmology and otology.

# SURGICAL INSTRUMENTS



**In general instruments can be divided into four classes by function:**

I. Cutting and dissecting instruments: (scalpels, scissors, surgical saws, etc.)

II. Grasping or holding instruments (retractors, hooks, tissue forceps, etc.)

III. Hemostatic instruments (hemostatic forces, clumps, etc.)

IV. Tissue unifying instruments and materials (needleholders, surgical needles, etc.)

# SUTURE MATERIALS



For each tissue there are special suture materials: for skin it is silk used, for subcutaneous loose connective tissue – capron and catgut, for muscle we also use catgut, for aponeurosis silk and lavsan are used, for intestines – capron and semi synthetic materials – polyester, perlon, supramid for vessels. The requirement for wound support varies in different tissues from a few days for muscle, subcutaneous tissue, and skin; weeks or months for fascia and tendon; to long-term stability, as for a vascular prosthesis. The surgeon must be aware of these differences in the healing rates of various tissues and organs. Suture selection should be based on the knowledge of the physical and biologic characteristics of the material in relationship to the healing process. The surgeon wants to ensure that a suture will retain its strength until the tissue regains enough strength to keep the wound edges together on its own.

# SUTURE MATERIALS



In some tissue that might never regain preoperative strength, the surgeon will want suture material that retains strength for a long time. If a suture is going to be placed in tissue that heals rapidly, the surgeon may prefer to select a suture that will lose its tensile strength at about the same rate as the tissue gains strength and that will be absorbed by the tissue so that no foreign material remains in the wound once the tissue has healed. With all sutures, acceptable surgical practice must be followed with respect to drainage and closure of infected wounds. The amount of tissue reaction caused by the suture encourages or retards the healing process. When all these factors are taken into account, the surgeon has several choices of suture materials available. Selection can then be made on the basis of familiarity with the material, its ease of handling, and other subjective preferences.

# SUTURE MATERIALS



Sutures can conveniently be divided into two broad groups: absorbable and nonabsorbable. Regardless of its composition, suture material is a foreign body to the human tissues in which it is implanted and to a greater or lesser degree will elicit a foreign body reaction. Two major mechanisms of absorption result in the degradation of absorbable sutures. Sutures of biological origin such as surgical gut are gradually digested by tissue enzymes. Sutures manufactured from synthetic polymers are principally broken down by hydrolysis in tissue fluids. Nonabsorbable sutures made from a variety of nonbiodegradable materials are ultimately encapsulated or walled off by the body's fibroblasts. Nonabsorbable sutures ordinarily remain where they are buried within the tissues. When used for skin closure, they must be removed postoperatively.

# SUTURE MATERIALS



A further subdivision of suture materials is useful: monofilament and multifilament. A monofilament suture is made of a single strand. It resists harboring microorganisms, and it ties down smoothly. A multifilament suture consists of several filaments twisted or braided together. This gives good handling and tying qualities. However, variability in knot strength among multifilament sutures might arise from the technical aspects of the braiding or twisting process. The sizes and tensile strengths for all suture materials are standardized by U.S.P. regulations. Size denotes the diameter of the material. Stated numerically, the more zeroes (0's) in the number, the smaller the size of the strand. As the number of 0's decreases, the size of the strand increases. The 0's are designated as 5-0, for example, meaning 00000 which is smaller than a size 4-0. The smaller the size, the less tensile strength the strand will have. Tensile strength of a suture is the measured pounds of tension that the strand will withstand before it breaks when knotted.



**Thanks for your attention!**

*Фото А. Воробьева*