

Medical History Article

Phlebology in ancient Greece and Byzantium

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ABSTRACT



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Phlebology in ancient Greece and Byzantium.

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The goal of this study is to examine and describe the methods and techniques, as well as the knowledge of the anatomy and treatment of venous pathology, and their influence on the birth of phlebology in ancient Greece and Byzantium. The study was

conducted reviewing sources in Russian and foreign literary in Greek and in English language, which, in turn, allowed a detailed study of discoveries and treatment in the field of venous system anatomy. Conservative methods are also described, as well as the first vein surgeries, precursors of modern surgical interventions that were unique for that time and are still relevant today. Brief biographies and discoveries of scientists of those eras are also mentioned.

Key words: history, phlebology, ancient Greece, Byzantium, varicose veins, outstanding physicians of antiquity, history of treatment of varicose veins.

INTRODUCTION

Lower limb vein disease is a widespread disease known to mankind since ancient times. It was the ancient physicians and then their followers who laid the foundation for the study of veins and their treatment. The great Greek physicians of the past - Hippocrates, Erasistratus, Herophilus, and later Oribasius, Paul of Aegina and others - contributed greatly

to the development of phlebology and were considered among the first to perform surgical interventions on the veins.

In ancient Greek medical literature, there are many reports of vein diseases and especially about varicose veins. This fact allows us to understand that veins diseases were considered important by doctors of Antiquity and

Byzantium, and especially varicose veins were referred as one of the main medical diseases of those times. Doctors used different methods and approaches in the treatment of vein diseases. The contribution of healers of antiquity to the emergence and development of modern phlebology is reflected. This disease was tried to be cured by prominent figures of antiquity and the Byzantine Empire in the field of medicine, such as Hippocrates, Galen, Oribasius, Paul Aeginsky and others. The article describes in detail the history and development of knowledge about venous pathology in ancient Greece and Byzantium.

MATERIAL AND METHODS

The study was conducted in accordance with the set goal. Russian and foreign literary sources in Greek and English language were used, which, in turn, allowed a detailed study of discoveries in the field of venous system anatomy, treatment of varicose veins, trophic ulcers and other venous pathologies in the historical periods - Ancient Greece and Byzantine Empire. The work includes data from printed works on Byzantine medicine by European scientists of the Middle Ages, manuscripts with detailed descriptions of venous manipulations, such as the works of Oribasius and Paul of Aegina. Brief biographies and discoveries of scientists of those eras who contributed to the development of the new field of medicine are given.

RESULTS-DISCUSSION

Ancient Greece

The foundations of modern medicine are believed to have been laid in ancient Greece. Although our knowledge of the "human body" has changed, the concepts of that era help us reflect on issues that are still relevant today. The first image of varicose veins was found west of the Acropolis, dating back to the 4th century BC. It depicts a bearded man with a varicose vein on his left leg¹. In his work "Comparative Biographies" Plutarch describes one of the first operations for varicose veins¹. The Greeks were looking for new ways to treat and study the circulatory system. Many of them are described by Praxogoras, Herophilus, Hippocrates and others. It was in ancient Greece that blood vessels were first described and the first to divide them into arteries and veins were Diogenes of Apollonia and Euriphonus of Cnidus in V-IV cc. B.C².

Diogenes of Apollonia (Διογένης ὁ Ἀπολλωνιάτης) (480-410 B.C) - citizen of Apollonia, a colony founded Miletus in Pontus. A contemporary of Anaxagoras, author of the lost work *περὶ φύσεως*. Diogenes was the first to describe the structure of the circulatory system and made a significant contribution to the development of the doctrine of the vessels of the human body³.

Euryphon of Cnidus (Ευρυφών ο Κνίδιος (Εὐρυφῶν)) (5th century B.C) - a contemporary

of Hippocrates. He was a famous ancient Greek physician from Cnidus in Caria (Anatolia). Euriphon described the presence of small blood vessels and described bleeding from them. Euriphon observed that blood was flowing from a damaged artery. This led him to the following conclusion: the dead have empty arteries empty, while the arteries of the living can contain blood⁴. Euriphon knew the difference between arteries and veins. In his opinion, they were separate systems from each other⁴. He came to these conclusions after dissecting corpses, having seen that there is blood in the veins, and there is no blood in the arteries. Only some time later Galen, having conducted a series of experiments, proved the existence of blood in the veins.

Only some time later Galen proved that Euryphon's statement was wrong⁵.

Praxagoras of Kos (Πραξαγόρας ὁ Κῶος) (4th century B.C). Ancient Greek physician, studied Aristotle's anatomy and improved it, discovered the distinction between veins and arteries, the latter name as a term, is attributed to him (άρτηρία)⁶. His views on arteries had a great influence on the development of physiology.

Herophilus (Ἡρόφιλος) (335 B.C, Chalcedon - 280 B.C, Alexandria) was a greek physician, a disciple of Praxagoras. He distinguished between arteries and veins, noting the presence of a pulse in the former and its absence in the latter. Together with Erasistratus, he studied the function and location on the human body of

veins and nerves. He conducted his experiments on animals by dissecting arteries and veins. His work "About pulse", where he describes mechanisms and differences of pulse types, became fundamental in the development of this direction in medicine⁷.

Erasistratus (Ἐρασίστρατος) (300 B.C, Keas - 250 B.C, Samos, Greece), a greek physician who was one of the most famous physicians and anatomists of antiquity. A native of the island of Keys, Greece, disciple of Theophrastus, father of botany and physician Chrysippus of Cnidus, grandson of Aristotle. He described the function and anatomical arrangement of the veins⁸.

Hippocrates (Ἱπποκράτης) (about 460 B.C, Kos - about 377 B.C, Larissa, Greece) – an ancient Greek physician and philosopher. He is known in history as the "father of medicine"⁹. Hippocrates is considered one of the most outstanding figures in the history of medicine. He was the first to point out that it was not necessary to cut a varicose vein, and the best option was to puncture it where necessary. In his works he notes that if varicose veins are localized on the back surface of the leg and the leg is dark in color, such places should not be cut as a complication in the form of a large ulcerous defect may develop, but the varicose vein should be punctured in different places^{9,10}.

Hippocrates also used conservative methods, pioneering compression using special sponges.

One of his recommendations was to make

punctures or small incisions in the veins, after which a tight bandage was applied. However, he pointed out that ulcers could appear after the incision. Hippocrates was the first to describe the relationship between varicose veins and the development of trophic ulcers of the lower extremities. He recommended flushing the ulcers with boiled water every day. His method of applying internal (hypodesmosis) and external (epidesmosis) dressings to the ulcerated limb is known; the external one was used to retain medications¹¹. Hippocrates suggests a very thin iron instrument that, when penetrated through the skin, will enter the vein and reduce the blood clot that has blocked it.

Historians believe that, in a sense, this idea of injecting a substance into the lumen of a vein can be considered the progenitor of modern sclerotherapy.

Benton Y (1970) found in the works of Hippocrates from 370 B.C a description of inflammation and elimination of varicose veins after its infected perforation by spikes of the famous *Plantus orientalis*, Hippocrates' tree¹¹.

Rufus of Ephesus (Ροῦφος ὁ Ἐφέσιος) (late 1st to early 2nd century A.D, Ephesus) – a physician of Greek origin and author of works on anatomy and surgery. He studied in Alexandria. He was to some extent a follower of Hippocrates. All that survives from the work of Rufus of Ephesus is called "curved veins, such as varixes, should be removed". Rufus recommends the removal of varicose veins

mostly located on the legs, "such veins, in cases of inflammation, become red and filled with blood"¹².

Heliodorus (*Ἡλιόδωρος*) – a greek surgeon (1st century A.D). Heliodorus wrote several books on medical technique, which survived in fragments and in the works of Oribasius. At the end of the first century he wrote the first account of arterial bandaging. In his words, "We bandage large vessels and catch small ones with hooks and bandage them"¹³. Heliodorus advocated ligation or compression of blood vessels to control hemorrhage.

Galen (*Γαληνός*) (129 or 131 CE - about 200 or 217 CE) – ancient Roman physician, surgeon, and philosopher of Greek origin. He believed that varicose veins were the root cause of venous trophic ulcers. In the treatment of varicose veins he used methods such as hirudotherapy, application of lime plaster and linen bandage. He removed varicose veins using a special hook and then tied them with silk ligatures. He treated trophic ulcers with young wine or wine vinegar. Galen knew the difference between arterial and venous blood¹⁴.

Byzantium

The Byzantine Empire, one of the largest empires of the Middle Ages, existed from 395 to 1453. It is worth noting that vein surgery was practiced by Byzantine physicians from the very beginning, as evidenced by the techniques described by Oribasius. It was he who was the

first Byzantine physician to take up the subject. His methods are based on the earlier knowledge of Greek physicians. According to all Byzantine physicians, the most common sites of varicose veins are the leg (probably the saphenous vein) and the abdomen.

Oribasius or Oribasius (Ορειβάσιος) (c. 325-405) – an ancient Greek physician and personal physician of Emperor Julian the Apostate. Oribasius compiled an encyclopedia of the Physician's Collection, consisting of 72 books, 27 of which have survived to the present day. In his work he combined the writings of Hippocrates, Galen, Dioscorides, Herodotus and others. Oribasius carefully described a number of surgical methods for treating varicose veins, some derived from texts of earlier Greek surgeons, to which he added his own observations. Oribasius, created a medical treatise, where the surgery of varicose veins occupies three chapters. The first and most extensive of these chapters is entitled "On Varicose Veins"¹⁵.

He begins the chapter by defining varicose veins, writing that "it is a condition of dilated veins in which they contain a lot of blood," and notes that varicose veins form on the head, stomach, scrotum, or legs. Most cases are in the legs, and for this reason he states that he begins his chapter with varicose veins in the legs. In his book XLVIII he publishes a treatise on the surgical treatment of ulcers and bandages¹⁵. Some of his recommendations are still valid: for

example, "vein removal is preferable to dressings and is indispensable because it can cause new varicose veins to appear."

He describes the operation and the preparation for it as follows: "The preparation of the patient takes place the day before surgery, the surgeon must shave the leg and wash the patient, then, while the patient is still warm from the bath, the surgeon must position him so that he rests only on the varicose leg and mark all the knots with small superficial incisions, and if the veins remain invisible during surgery for various reasons, we will not fail, because the location of varicose veins can be determined from the marks that were made before surgery."

These incisions should be made straight, in the direction of the varicose veins"¹⁵. "We extract the vein by pulling it up," he writes.

Description of the operation and preparation for it is mentioned at the following text: «...Before the operation, the patient is placed face down. Using hooks called "circulce" (varicose extractors, a type of forceps, small in size, resembling the Greek letter "gamma - γ"), we pierce the skin surface at the very top of the edema, next to the incision sign. Then turn the hook so that the skin bends and becomes tense and curved. We make a small incision in the skin and separate the skin, not reaching the varicose veins. We see the white membranes. Using the previously used hook, we perforate, pull and tear them until we reach the veins. If there are many membranes, the procedure can

be repeated three or four times. Then, using a non-sharp hook called τυφλαγκιστρον (typhlangistron, "blunt hook" used to raise the vein), turn down toward the varicose vein. If the manipulation is unsuccessful, with the second with the second hook do the same, but in the opposite direction, surround and raise the varicose vein with the two hooks. If the vein was not lifted because it is deep or because it has slipped, place the blunt hook so that a right angle is formed between it and the vessel. We move the end of the hook to the surface of the skin, and from the outside with the little finger of the left hand we press the skin against the hook so as to securely grasp the vessel, which often slips due to pressure. If the vein has not been grasped again, the hook is turned in the opposite direction and the procedure is repeated. If even after that the attempt is unsuccessful, we take two pointed hooks, which we give to the assistants to hold the incisions open, and with the third curved hook we cut and separate the membranes. Under the variceal vein we place a soft object or blunt needle with a thread. After the first incision and separation of the varicose vein, continue with other incisions in the same way, not starting from the lower leg. If the vein is straight, the incisions are made with at least two fingers apart (one finger is 1.8 cm)¹. Venotomy is the main stage. It starts with the lower leg. Lower hook turns to the ankle and the upper hook turns to the calf muscle and we pull out the varix that is in the

ankle and cut it. Then we proceed to the second step from the bottom, just pull out the varicose vein and cut it. However, if branching veins, in the form of Y (two veins) or (three veins) ψ, or even more branches, pull each of them separately and cut each one...»¹⁵.

For the technique of straight cut (ευθεία τομή): «...If the varicose veins are severely curved and removal by pulling is useless, a straight incision is required to remove such veins»¹⁵.

For sophisticated cutting and removal techniques: Oribasius notes that «varicose vein forms consisting of a cluster of thin veins resembling a "wool ball" should not be stretched, as it quickly ruptures. In the case of "woolly varicose veins," after placing blunt hooks under it, it should be removed, not cut, because otherwise the ends of the cut vein will come into contact with each other again and a new varix will form».

For postoperative treatment: According to Oribasius there is no danger of hemorrhage after this operation. He wrote: «Nevertheless, we must press hard on the leg to remove the clots above the incision that was made in the popliteal fossa. We press from below and proceed to the lower leg, pressing particularly hard on the calf muscle, so as to remove blood from all incisions. The pressure should be done with your hands, firmly and steadily, using a sponge. It is extremely important that not even the tiniest clot of blood is left after surgery, as pus may form, resulting in fluid - hematomas -

in the incisions. Treatment is always successful if the clots are carefully removed. The surrounding tissues should not be subjected to too much pressure, as there is an additional risk of damaging them»¹⁵. He also used poultices soaked in a solution of vinegar and milk, and soft bandages. He performed surgeries for varicose veins on the head. This manipulation is described in a separate chapter of his book ("On Angiology")¹⁵.

For abdominal varicose vein surgery: «In epigastrium varicose veins it is not possible to use vein pulling method. If the knots resemble grapes, the ευθυσοτομία method (straight incision, the name of the method introduced by him) is used. He also uses this term in the treatment of varicose veins of the lower extremities»¹⁵.

For scrotal varicose vein surgery: The second chapter of the book is devoted to scrotal varicose veins and follows the advice of the famous Greek surgeon Heliodorus (1st century AD), who performed vessel ligation. He describes a method of incision similar to the one that is used for the feet. His other method was cauterization with olive cacti. In the third chapter on varicose veins, Oribasius recounts Galen's knowledge: «Nature accumulates melancholy blood in the veins of the legs, causing them to dilate, with the passage of time the skin becomes black. If there is a chronic ulcer on the leg above the varicose vein, this condition is treated after the varicose vein is

removed, but the scar will not heal». He writes that Galen's teacher of Pergamum, Stratonica, cured the ulcer by dissecting veins, a suitable diet, and laxatives.

For trophic ulcers: In his book XLIII, in chapter 37 titled: "On the Difficulties of Treating Ulcers Over Varicose Veins", he recommends, in contrast to Galen, to make an incision along the vein and carefully emptying all its contents. After that, a laxative should be administered. Oribasius was the first to describe methods of aneurysm surgery. His famous book, *Synagoge Medicae*, contained special chapters devoted to operations for varicose veins¹⁵.

Paul of Aegina (Παῦλος Αἰγινήτης) (c. 625—c. 690) born on the island of Aegina near Athens, Greece, was a seventh-century Byzantine Greek physician, teacher, and writer best known for writing the *Encyclopedia of Medicine*. A medical compendium in seven books (Ἐπιτομῆς Ἰατρικῆς βιβλία ἑπτὰ) that summarized the medical knowledge of ancient authors (primarily on surgery and obstetrics)¹⁵. The operations described by Paul were considered classical until the 17th century. During the Renaissance, the University of Paris recommended that surgery be taught only from his books^{15,16}. Paul studied all sections of surgery, trauma, primarily such as sprains and fractures, amputations, cavity surgery, etc. In a chapter of his book, Paul described a technique similar to that of Oribasius: The technique: «A

vein is identified, a needle is inserted under it, then an incision is made, after which the vein is tied at the beginning and end. A lancet is used to open the vein and the blood is removed»¹⁵. He emphasizes that this is a complicated operation, and if the varix is branched, in this case he recommends a special preparatory test: «After the patient has had a bath, a tourniquet is placed on the upper thigh and the patient is sent for a walk. In this way, the vein is filled with blood...The location and course of the vein is drawn in ink. The patient is placed horizontally with the leg extended and a second tourniquet is applied just above the knee. The vein is swollen».

The Operation: «Then, using a lancet, the skin is cut in the already marked place, taking care not to cut the vein itself. Using a hook, the edges of the incision are left open and the membranes are separated. The procedure continues as before, using double sutures. After securing the the first ligature at the top of the varicose vein, the thigh is lifted and the area is squeezed with the surgeon's hands to remove blood, then the second ligature is applied to the bottom of the varix, and then either the area of the vein between the two ligatures is trimmed and removed, or the vein is left as it is until it disappears on its own, along with the ligatures»¹⁵.

Paul notes that some of the earlier earlier physicians did not use ligatures, but directly cut the vein they found, while others pulled the

vein and removed it (he refers to the method described by Oribasius for the extraction of varicose veins). He considers his method to be the safest. And he concludes his chapter by writing that varicose veins of the abdomen are operated on in the same way as those on the head. One of the most remarkable moments in the development of varicose vein surgery is the resection between the incisions of the great saphenous vein, which Paul performed, and twelve centuries later Trendelenburg proposed it. The sixth book on surgery, in particular, was mentioned in Europe and the Arab world during the Middle Ages and is of particular interest to the history of surgery. The entire work, in Greek, was published at Venice in 1528 and under the title *Memorable Records* (ὕπομνήματα), at Basel in 1538 in a Latin translation. An English translation was made by Francis Adams in 1844-1847. The physician from the island of Aegina made a great contribution to the development of surgery and was one of the most famous physicians of Byzantium¹⁵.

Alexander of Trales (Ἀλέξανδρος ὁ Τραλλιανός) (c. 525 - c. 605) – greek physician; resided in Rome; author of "On Internal Diseases and Their Cure," written from his own experience, the work consisted of twelve books and influenced the development of medicine in the Byzantine and the Arab world. During his lifetime he was nicknamed *Yatros*, which

means "healer"¹⁷. He was the first to be credited with the dissection of the jugular vein.

Aecius of Amidia, or Aecius of Amida (Αέτιος ο Αμιδηνός) (c. 502 - c. 572) – Byzantine physician. Aetius studied in Alexandria, then the center of the scientific world. He was a court physician of emperor Justinian I and had the rank of κόμης ὄψικίου. He is known as the author of the fundamental medical work "Sixteen Books on Medicine"¹⁸.

The fourteenth book contains sections on skin diseases, hemorrhage, and varicose veins. Aetius believes that phlebotomy is a good treatment option and suggests incisions to remove blood. According to him, large vein size is an indication for phlebotomy. He recommends avoiding surgery in childhood and old age. He also quotes some statements by Galen and recommends avoiding bleeding during the cold season or "when human nature is colder than usual"¹⁸.

CONCLUSION

The history of phlebology is rich in discoveries and achievements, since ancient times methods of treatment of vein diseases and trophic ulcers of the lower extremities have been developed. Methods that originated in ancient Greece, such as miniphlebectomy, vein banding, and compression therapy, are still used today. Surgeons of the Hellenistic era were the first to remove varicose veins. In earlier times, these operations were unknown. Byzantine

physicians believed that the most common areas of varicose veins were the lower extremities, the abdomen (abdominal "jellyfish head") and the temporal lobe. The methods of vein surgery by Byzantine physicians are based on those of the famous Greek physicians of the Hellenistic period, which carried over into medieval surgery, influencing and inspiring even modern surgeons. For example, the modern "vein entrapment technique" described in 1975 has its origins in the Byzantine period. Paul in the seventh century. (607-690) resected a section of the great saphenous vein between ligatures, closely approaching the operation proposed 12 centuries later by Trendelenburg. In turn, a time later, Friedrich Trendelenburg (1844-1924) referred to the operation described by Paul of Aegina and other ancient surgeons, as he himself pointed out in his historical review. Although Paul of Aegina did not describe reflux, his preoperative tests for varicose veins bear a striking resemblance to those of Benjamin Brody and, later, Friedrich Trendelenburg. In addition, he removed the veins and then applied a pressure dressing. Thus, the methods of vein treatment described by Byzantine physicians were based on the methods of physicians of the ancient Greek period, which are the origins of phlebology.

Additional materials: No

Acknowledgements

Not applicable.

Funding

Not applicable.

Availability of supporting data

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Ethical approval and consent to participate

No IRB approval required.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

Received: January 2021, Accepted: March 2021, Published: April 2021.

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Citation: Aledzhanov N. Yu. Phlebology in ancient Greece and Byzantium. Greek e j Perioper Med. 2021;20(b):2-12.