



**EMPIRICAL AND ANATOMO-MORPHOLOGICAL PERIODS OF THE DEVELOPMENT OF SURGERY**

*(a brief historical essay)*

*To perform surgery is to eliminate that which is superfluous, restore that which has been dislocated, separate that which has been united, join that which has been divided and repair the defects of nature.*

*Ambroise Paré,  
a 16th-century French surgeon*

*Surgical manipulations date back to the earliest span of human development, long before the development of surgery as a specialty. Our primitive ancestors, alongside with making the most primitive tools used in everyday life to obtain fire, to hunt and to fish, were forced to find ways and means to heal wounds, to extract foreign bodies, to stop bleeding, 'to trepan' the skull, immobilize fractures and other procedures which are currently classified as surgical manipulations. That is why, for many centuries the history of surgery was considered in the context of the history of medicine in general. At the same time, the development of surgery from ancient times to the present days can be divided into five main periods:*

- 1. an empirical period, from the 6<sup>th</sup>-7<sup>th</sup> centuries BC to the end of the 16<sup>th</sup> century AD*
- 2. anatomo-morphological period, from the end of the 16<sup>th</sup> century to the end of 19<sup>th</sup> century*
- 3. the period of great discoveries of the late 19<sup>th</sup> and early 20<sup>th</sup> centuries*
- 4. physiological period - surgery of the 20<sup>th</sup> century*
- 5. contemporary surgery of the late 20<sup>th</sup> and early 21<sup>st</sup> centuries*

*The article presents the annotated version of the history of surgery at the relatively early stages of human development i.e. in the empirical and anatomo-morphological periods.*

**EMPIRICAL PERIOD.** *Modern people have received and still continue to receive information on surgical manipulations performed by primitive people over the empirical period through studying and decoding manuscripts, hieroglyphs, preserved mummies as well as carrying out archeological excavations on the sites where ancient people inhabited.*

*At this time of development of the surgery ancient people had already begun to form ethical and human approaches to restoring the health of their tribe members, performing such radical manipulations as trepanation of the skull, amputation of the limbs, removal of the stone from the bladder, castration, radical excision of purulent wounds and burns. Often, archaeological finds in the ancient human habitat indicate that some of the patients who underwent trepanation of the skull and other surgical interventions survived and died many years later. Surgical operations are described in many sources of the ancient nations of China, Egypt, Greece, Persia, Armenia, etc. Moreover, in many of these sources the aspects of anatomy and surgery are considered in totality. There are examples of "healers" who treated wounds and fractures during the battles. The description of surgical manipulations was found in one of the ancient Egyptian papyrus and Imhotep, a physician, is credited with performing surgical operation in 3000BC.*

*Hippocrates (460-377 BC), a famous physician in ancient history, in his routine practice used casts, traction and exercises to heal broken bones which was the most radical treatment for that time. Methods suggested by Hippocrates, such as reduction of shoulder joint dislocation, pleural cavity drainage are widely used at present.*

*Cornelius Celsus (30 AD-38 AD) was the disciple of Hippocrates in Ancient Rome, who wrote the treatise on surgery, where many operations, particularly lithotomy, trepanation of the skull, amputation, treatment of dislocations and fractures, methods used to stop bleeding were described. Celsus was the first to suggest applying ligature to a bleeding vessel and described classical signs of inflammation such as calor (fever), dolor (pain), tumor (swelling), rubor (reddening) without which we can hardly imagine the study of inflammatory process and diagnosis of surgical infectious diseases. Claudius Galen (190-210 AD) was another respectable*



successor of Hippocrates, whose opinion was dominant in the field of medicine for many years and who had an undeniable contribution to surgery. Galen suggested an operation to correct upper jaw defects and a method of "twisting vessel" in order to stop bleeding. Ibn-Sina (Avicenna) (980-1037 AD) was the greatest representative of Eastern ancient medicine. Avicenna was the author of about a hundred scientific works, "Canon of Medicine" being the most famous one. Quite informative data on ancient medicine in the territories of modern Middle East and Asian countries, and particularly in Armenia, are available in the first volume of the multivolume "The History of Medicine in Armenia", published in 1945 by academician L.A. Oganessian. In his monograph L.A. Oganessian chronologically presents the development of medicine in Armenia from ancient times up to the present, in which the reader sporadically encounters information on the character of surgical manipulations among the ancients. So, the Hittites knew some surgical approaches, which they used in castration.

As you know, Urartians were very close to Assyrians, so it influenced their relationship, and especially the development of ancient fields of knowledge, including medicine. Among many preserved ancient Urartian monuments, there is a statue depicting "eunuchoid, judging by the appearance". Apparently, Urartians were able to perform castration.

As noted by Oganessian, in the distant past, trepanation of the skull was performed by many nations who were yet at a very low level of cultural development. Skulls with signs of trepanation, relating to the Bronze Age were found in England. Three skulls with signs of trepanation also relating to the Bronze Age were found in Armenia as well.

Further, Oganessian acquaints the reader with one of the most interesting artefacts of Urartian medicine, found at the end of 1926 during excavations near Yerevan, the capital of Armenia. A skeleton of a Urartian with a trepanned hole on the skull was found during excavations near the quarry in the village of Avan. The hole was scribed out with sharp objects. Oganessian also points, that among the objects of pre-Christian, probably of Urartian origin, there are a number of medical items of the Bronze Age such as epilators, forceps, etc. found in old pagan graves unearthed under the ruins of the Ani city.

Over the following years, a series of monographs and essays on the history of ancient Armenian medicine were published in Armenia by such authors as Harutyunyan G.G., Ktsoyan A.S., Melik-Parsadanyan Kh.A., Sepotchyan A.O., Vardanyan S.A., Khudaverdyan A. and others.

**SURGERY IN THE MIDDLE AGES.** Achievements of many medieval medical scientists were overshadowed by the dictation of Church. Previously described and permitted, operations in surgery were banned. Italian surgeons Lucca (1200) & Bruno (1250), Frenchman Mondeville (1320) and others carried out their fruitful activity in this difficult period in the development of science and medicine.

Thanks to the Italian anatomist Mondino De Liuzzi, the practice of public autopsies, forbidden by the medieval Catholic Church for a long time, was resumed again. His treatise "Anatomy" (1316), based on the results he obtained from autopsies rather than a narration of Galen's and Ibn Sina's works, became the first anatomical tractate since Galen's time and was the authoritative manual over the next 300 years.

The first references to medical institutions and renowned doctors in Armenia can be found both in Armenian and foreign sources as early as in the 5th century. The medicine in Armenia was flourishing mostly during the XII-XV centuries, when scholars like Mkhitar Heratsi (XII century), Abu Sa'id (XII), Grigoris (XII-XIII), Faraj (XIII) and Amirdovlat Amasiatsi (XV century) lived and worked. These scientists summarized their experience and together with the knowledge obtained from the works of Greek and Arabic physicians created treatises of their own, which were reproduced and applied in practical medicine for centuries.

**ANATOMO-MORPHOLOGICAL PERIOD.** This period of the development of medicine was much more progressive, unlike the previous one. Fundamental research of the outstanding anatomist Andreas Vesal (1515-1564), reflected in his major work "De corporis humani fabrica" where many conceptual-dogmatic positions, prevailing in the early Middle Ages were fundamentally revised based on the experience of numerous autopsies played its tremendous role in the development of surgery.

Significant contribution, invaluable to the development of surgery was made by the Swiss physician Paracelsus (born Theophrastus von Hohenheim, 1493-1541). Being a surgeon, he offered new radical and palliative methods of treating wounds.

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*William Harvey (1578-1657), an English physician, physiologist and embryologist had his fruitful activity during the Renaissance, the period of the development of medicine. He was the first known physician to describe the laws of systemic circulation completely and detailed.*

*The invention of the Dutch naturalist Antoni van Leeuwenhoek (1632-1723) who is sometimes called "the inventor of microscope" as well as the description of capillary circulation and discovery of blood clots by Italian biologist and physician Marcello Malpighi (1628-1694) in 1663, contributed greatly to the development of medicine and surgery.*

*Armenia was permitted to conduct autopsy for educational purposes since the XII century, meanwhile it was allowed in Europe only since the sixteenth century. The oldest preserved medical instruments were found in different regions of Armenia which point to the fact of operations being performed. Cesar section, tumor resection, surgical treatment of various female diseases and other surgical manipulations were performed in Armenia in the XII-XIV centuries.*

*Mandragora officinalis was used as a general and local anesthetic during the operations; Zedoar, Melilotus officinalis were applied to relieve the pain during delivery; silk thread was used to sew wounds. The period from 1465 to 1473 is described as especially productive in the development of Armenian medical concepts, as described in N415 Copies of Handwritten Medical books by Grigoris kept in Yerevan Matenadaran.*

*The treatise consists of two main sections: researches on pharmacy and general medicine. Along with pathology, Grigoris also studied various issues related to pathological physiology and anatomy. The author's comments on the role of the brain are extremely valuable. "The brain is the king of the whole body", he writes. "The nervous system and the brain are the main organs of the human body. The brain is "sensation of senses". Disorders of the upper and lower extremities are mainly caused by the liquids accumulated in the brain ventricles and other sites.*

*There are numerous treatises on medicine of unknown authors, medical dictionaries and similar works kept in Yerevan Matenadaran.*

*Establishment of Surgical Academy in Paris in 1731 and surgical hospitals and medical schools for the training of surgeons in England promoted the development of surgery in European countries. In the Middle Ages, surgical science started to develop in the Netherlands either. In particular, Nicolaes Tulp, famous surgeon of the period, practiced in Amsterdam.*

*A separate historical essay on the activities of Nicolaes Tulp is published in this issue of The New Armenian Medical Journal.*

*The aim of this article was not the thorough introduction of the achievements of numerous prominent scientists of their time, who made significant contribution to the development of medical science, from the empirical to the anatomo-morphological periods, but to cover the activity of outstanding scientists in particular branch of medicine i.e. surgery, since, despite the large number of fundamental researches made in this field, the aspects concerning the development of surgery over this period is yet not sufficiently elucidated.*

*The goal we pursued in the present report was to briefly familiarize the reader, even not specialist in medicine, with the most significant achievements in surgery in the relatively early period of human development, which later served and still continue to serve as a basis for further progressive development in the field. In addition, the reader is not sufficiently informed about the development of medical science, and particularly surgery in ancient and medieval Armenia, so we tried to reflect this aspect of the development of surgery in ancient and medieval Armenia in this report.*

*Editorial Board*