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**Tomić, Danijela; Laginja, Stanislava**

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## Lorenz Heister's handbook of surgery in the Franciscan monastery in Pazin

Danijela Tomić<sup>1</sup>, Stanislava Laginja<sup>2</sup>

<sup>1</sup>Department of Anesthesiology, <sup>2</sup>Department of Dermatology; General Hospital Ogulin, Croatia

### ABSTRACT

The oldest library in Istria (Croatia) is located in the Franciscan Monastery of Pazin, with a rich fund of worthy old books. Our attention was attracted by the book "Chirurgie" written by the German physician, surgeon and anatomist Lorenz Heister in the first half of the 18th century. This worthy book is relatively scanty known in Croatian history of surgery. By studying the contents of the book written in the 18th century, numerous surgical instruments, as well as surgical operations may be found, many of them being used even today with little modifications. Among the instruments different types of pincers, needles, scissors, knives, saws, hammers, chisels and others can be found. The description of different surgical procedures reveals great advancement in the surgical technique. The book was very popular in Europe for a century.

**Key words:** German surgeon, 18<sup>th</sup> century, surgical instruments, surgical procedures

### Corresponding author:

Danijela Tomić  
General Hospital Ogulin  
Bolnička 38, 47300, Ogulin, Croatia  
Phone: +385 91 527 84 32;  
Fax: +385 47 801 770;  
E-mail: danijelari@net.hr

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## INTRODUCTION

The first greater libraries in Istria appeared during the Middle Ages or at the beginning of the Renaissance originating from the Benedictine, Franciscan or Pauline monasteries. The oldest library in Istria, Croatia, is that of the Franciscan monastery in Pazin, founded in 1481 and remained open until nowadays (1). The Franciscan monastery of the Visiting Blessed Virgin Maria in Pazin was founded after the Bulla of Pope Sixtus IV "*Inter cetera*", on recommendation of the emperor Frederick III. It was constructed near an old little church in the old Gothic style. In 1704 the monastery suffered damage during the French rule, and transformed to a military depot. It was renewed during the years 1986-1989 (2). The monastery had a little hospital, a drugstore, and the library that was at disposal only for the friar, and the books can be used out of the monastery only by the Franciscans. Books in the library mostly come from personal legacy of friars, and consists of the old books catalogued from 1891 to 1913 containing books published from 1482 to 1913, and new books, which are not catalogued. The majority of books deal with theology and philosophy, but a number of the are related to literature, church laws, rhetoric, geography, history, linguistics, and medicine. Among the oldest books is an incunabulum written by Nicolaus de Lyra "*Postilla in Vetus et Novum testamentum*", Venetiis 1482, in four volumes (3,4).

In the library we have found a rare old book "*Chirurgie*" (Surgery) written by Lorenz Heister, an outstanding physician, surgeon and anatomist of the 18th century (5). Because the history of this surgeon and his book being rather unknown in surgical history, we believe it will be of interest to describe shortly his life and the book's contents.

## LORENZ HEISTER

Lorenz Heister was born on 19 September 1683 in Frankfurt am Main, and became one of the most famous German physicians, anatomists, surgeons and botanists. He finished the gymnasium in his town, went to study medicine first at the Universities of Giessen (Germany) and Wetzlar, from 1702 to 1706, then continued his studies in Leiden and Amsterdam (Holland), where his professors were Frederick Ruysch, Hermann Boerhaave and Bernard S. Albinus. During his study in Giessen he already had a possibility to dissect a corpse under

the supervision of Georg T. Berthold. In 1707 he became an assistant physician in field dressing hospitals in the war of Spanish succession. In 1708 he obtained his doctor's degree at the University of Harderwijk, and the next year he rejoined the army of the Netherlands gaining great experience on the wound surgery (5-7). In 1710 he was appointed professor of anatomy and surgery at the University of Altdorf near Nurnberg (Germany). There he did not only lecture to the students, but wrote his "*Compendium anatomicum*" (1717), and in 1719 he published his famous book "*Chirurgie*" (Surgery) in German. Garrison in his book on the history of medicine erroneously wrote that the book had been published in 1718 (8). The book gave a systematic view of all aspects of surgery of that time.

In 1720, soon after the first edition of this book, he was appointed as a professor of anatomy, medicine, and surgery in Helmstadt (Germany), and later taught botany too. There he created a famous botanical garden. In Helmstadt he taught and worked continuously for 38 years (9,10).

Heister had a great personal library with about 12,000 books, and spoke fluently a few languages. Heister was the first who described the inflammation of the appendix (appendicitis) in a corpse, and he presumed that the alteration in crystalline is a cause of cataract rather than a change in the cornea as it was believed before. He also made the first successful thyroidectomy, introduced the term "*tracheotomy*" in medicine, and described the spiral valve in the *ductus cysticus*. As regard to botany he was acquainted with the classification work of Carolus Linnaeus (Carl von Linne), and his herbarium consisted more than 90 volumes, and the genus of plants *Heisteria* was termed in his honor. Heister was a fellow of the Royal Society of London and of the Royal Academy of Paris. He died on 18 April 1758 during a consultation in Bornum, and was buried in the cemetery of Helmstadt.

## LORENZ HEISTER'S CHIRURGIE

Lorenz Heister's most important book is "*Chirurgie*". It was the first book which presented the surgery clearly and systematically, encompassing all surgical instruments, bandages, and surgical operations step by step including possible complications. In 1719 the text was published first in German and was entitled "*Chirurgie, in welcher*

alles was zur Wundartznei gehört, nach den neuen und bester Art, gründlich abgehandelt”, because the author knew that the majority of the students were uneducated and had poor knowledge of the Latin language (11). The book attracted great interest and popularity with good illustrations in copper plates, so it was soon sold out and new editions followed. Later, the book was translated in Latin as *Institutiones Chirurgicae* for all students and surgeons, and it was translated into English, French, Italian, Dutch, Spanish and even Japanese. In the monastery there is a German edition of the book printed in 1739, which had a few corrections and was enlarged. It is a rather voluminous book with 896 pages including 22 pages of the introduction and 44 of the index. Introductory pages include a picture of the author (Figure 1) and the Privilegium (consent) in which Carl of Hapsburg allowed typographer Matthias Wolff to print the book *Chirurgie* written by professor Lorenz Heister.



**Figure 1. Portrait of Lorenz Heister** (Heister L. *Chirurgiae*, p.1) (Tomić D, 2012) (with permission of fra Alfons Orlić, Franciscan Monastery in Pazin)

The consent was dated 12 January 1739. The Prologue was set after the Privilegium. Heister wrote the Prologue for the first edition in 1719 “After the God choose me for this profession besides other sciences associated with the noble medicine, I had to learn surgery that is a noble profession, the most necessary to mankind”. The author continued delineating brief history of the development of this art and science from ancient Egyptians, Greeks, Romans to his days.

The next, special part of this book of surgery is divided in three parts. The first comprises wounds, frac-

tures, dislocations, tumors and ulcers. The second part is dedicated to different surgical operations, and necessary instruments, according anatomic regions of the body. The third part describes bandages.

The first part contains five books.

The first book is divided in 16 chapters. The first chapter is dedicated to wounds. At the beginning the author explains what a wound is, i.e. a violent dissolution of continuity of an external part of the body caused by outer factors such as violent falls, knives, gun shots, blunt tools, arrows, animals bites. In cases originating from some alterations from internal parts of the body it was an ulcer. The author explained causes (etiology) of the wounds and possible injuries of deeper structures, such as blood vessels, nerves, bones and others.

The second chapter describes possible complications of the wound, such as bleeding, pain, convulsions, fever. The wounds are described according to their anatomic localization, so they are characterized as the wounds of the head, forehead, eyes, ears, nose, mouth, neck, chest, belly, extremities.

The 15<sup>th</sup> chapter describes contusions, their clinical aspect and treatment. The 16<sup>th</sup> chapter is dedicated to poisoned wounds (from poisoned arrows, snakes, animal bites). Their treatment and necessary surgical instruments are also described here. On page 82, there is an illustration (Figure 2) of a table with numerous instruments (11): tourniquet to stop bleeding, pincers (or tongs) called “crane’s beak”, pincers termed “duck’s beak”, pincers called “Goose’s beak”, hook for the extraction of bullets, and a boring tool used for the extraction of bullets invented by Bartolomeo Maggio.



**Figure 2. Instruments and pincers** (Heister L. *Chirurgiae*, Part 1, Chapter 1, p. 82) (Tomić D, 2012) (with permission of fra Alfons Orlić, Franciscan Monastery in Pazin)

The second book of the first part of Heister’s Surgery is dedicated to different types of fractures and comprised 12 chapters, with the description of their clinical aspects in different bones and

regions: head, jaw, sternum, ribs, spine (which was a serious problem, nevertheless, the surgeon dedicated his maximal attention to remove the eventual fragments), extremities, and other, as well as the necessary treatment.

The third book is divided into 12 chapters, where the author explains various types of luxations in different articulations, and possible reparation and adequate interventions.

The fourth book with 19 chapters presents tumors in various parts of the body, and it can be seen that the author did not describe them here only „*sensu stricto*“, but also inflammations, venereal buboes, ulcers, boils, burns, edemas and other. Heister was among the first surgeons who treated malignant tumors with radical operations.

The Fifth Book is dedicated to ulcers describing fistular ulcers, venereal ulcers, chronic ulcers of legs and their treatment.

The second part of the „Chirurgie“ is dedicated to the surgical operations and it was divided in six parts or sections, that comprised 175 chapters.

In the first section Heister describes surgical operations on different parts of the body: head, eyes, forehead, thorax, abdomen, penis, foreign bodies. In the 14th chapter (on page 402) he writes about bleeding, necessary instruments, whereas on page 403 the necessary instruments are illustrated (tubes, bladders, syringes). A primitive mode of transfusion from a hand of one man to another man (Figure 3) and amputation of an extremity (Figure 4) are also illustrated.

The second section describes the interventions on the head.

The third section is about surgical operations on the neck. In Chapter 151 Heister paid special attention to the operation that permitted breathing, such as laryngotomy, tracheotomy (he in-



**Figure 3. Instruments and mode of transfusion** (Heister L. *Chirurgiae*, Part 2, Chapter 14, p. 403 (Tomić D, 2012) (with permission of fra Alfons Orlić, Franciscan Monastery in Pazin)



**Figure 4. Instruments for amputation of an extremity** (Heister L. *Chirurgiae*, Part 2, Chapter 32, p.456, (Tomić D, 2012) (with permission of fra Alfons Orlić, Franciscan Monastery in Pazin)

troducted those names) and thyroidectomy.

The fourth section presents an operation on the chest, and especially interesting is the description of operations on breasts and nipples: lumpectomy and radical mastectomy with removal of the axillary lymph nodes and the pectoralis major muscle in cases of cancer.

In the fifth section the author describes an operation on the abdomen for hernias, hydrocele, phimosis and paraphimosis and operation of the womb, prolapse of the uterus or vagina, and in Chapter 156 interventions during the parturition (delivery), problems with the fetus transversal position (Figure 5), and other gynecological or obstetrical disorders (11,12).



**Figure 5. Position of fetus in uterus and instruments for delivery** (Heister L. *Chirurgiae*, Part 2, Chapter 156, p.790 (Tomić D, 2012) (with permission of fra Alfons Orlić, Franciscan Monastery in Pazin)

The sixth section demonstrates various surgical treatments on upper and lower limbs.

The third part of the "Chirurgie" deals with the bandages; the materials are exposed in eight chapters describing their application on the head, neck, chest, abdomen and on upper and lower extremities. In this part there is also a description of various types of surgical needles and sutures (11).

## DISCUSSION

Between the 15th and the 18th century surgery had developed slowly without any revolutionary progress (13). Physicians were frequently derided

because of their better education, humoral theory, knowledge of Latin; surgeons were mostly without knowledge of anatomy, illiterate practitioners. Therefore, barber-surgeons tried to organize a guild to obtain greater importance. Nevertheless, some surgeons were “self-made“, like Ambroise Pare’, who introduced the ligature of vessel during amputation, rose oil instead of boiled oil for wounds, demonstrating that medicine and diet cannot cure everything, and the practice was more important of *dictum* (14). Heister had a clear vision of these problems at the beginning of his career. His “Chirurgie“ represented a methodical and complete book of surgery. In this book one can find all the necessary materials for surgical operation on any type of wounds, or for a disease of any organ. Heister described new surgical techniques, new instruments, important ideas about cataract, decisions during problematic deliveries (15). The description of different types of fractures either simple or complicated was accurate, and a prognosis depended on the type of fracture (near or far from an articulation), transversal or oblique. Information on fracture of one or more bones, age of the patient, association with or without injuries and other structures was important for the prognosis. The author describes all possible interventions in cases with hemorrhage: compression, turpentine, use of cautery, tourniquet, ligature, and use of dry or bloody suture (16). Particular attention is dedicated to venereal ulcers and their treatment. It should be remembered that after Heister, the famous surgeon John Hunter, believed that gonorrhoea and syphilitic ulcer were the same disease on the basis of unfortunate experiments of inoculation in 1767 (17). So Heister’s book represented an important milestone for the new generations of surgeons not only in Germany but in Europe. Some people

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called him the father of German surgery (9,18). In Heister’s time, although there were other famous surgeons such as August Gottlieb Richter in Germany, who published the first journal of surgery entitled *Bibliotheca Chirurgica*, distinguished surgeons such as Jean L Petit (1674-1750) in France, and William Cheselden (1688-1752), a great anatomist and surgeon in England, Heister was one of the greatest in the 18<sup>th</sup> century (18).

Certainly, for greater advances in surgery one had to wait until the end of the 19<sup>th</sup> century when the introduction of anesthesia and asepsis and antisepsis opened new possibilities.

In conclusion, we accented that Heister’s book “Chirurgie” had great importance because it was written at the beginning of the 18<sup>th</sup> century. Heister was one of the most capable physicians, anatomists and surgeons of that time, when physicians showed with an air of superiority to the surgeons. This book was the first one that provided complete and systematic knowledge of everything that was necessary to perform successful surgical operations in all surgical fields. The author taught his students that surgery was a fine art and a science. Today we are the witnesses of surgery’s prodigious successes.

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## TRANSPARENCY DECLARATIONS

Competing interests: none to declare.

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## Udžbenik kirurgije Lorenza Heistera u franjevačkom samostanu u Pazinu

Danijela Tomić<sup>1</sup> i Stanislava Laginja<sup>2</sup>

<sup>1</sup>Odjel za anesteziologiju, <sup>2</sup>Odjel za dermatologiju; Opća bolnica Ogulin, Ogulin, Hrvatska

### SAŽETAK

U franjevačkom samostanu u Pazinu postoji najstarija knjižnica u Istri (Hrvatska) s bogatim fondom vrijednih starih knjiga. Našu pažnju privukla je knjiga *Chirurgie* njemačkog liječnika, kirurga i anatora, Lorenza Heistera, pisana u prvoj polovici 18. stoljeća. Ovaj vrijedni primjerak knjige je zapravo nedovoljno predstavljen u hrvatskoj povijesnoj građi kirurgije. Proučavanjem sadržaja udžbenika, napisanog u 18. stoljeću, uočava se zastupljenost brojnih medicinskih instrumenata i različite kirurške tehnike, od kojih se neki, uz određene modifikacije, upotrebljavaju i u današnje vrijeme. To su različita kliješta, igle, škare, noževi, pile, čekići, dlijetla i sl. Opis operativnih tehnika ukazuje na napredak u kirurškoj djelatnosti koji je bio vrlo cijenjen kroz jedno stoljeće.

**Ključne riječi:** njemački kirurg, 18. stoljeće, kirurški instrumenti, operativni zahvati