The anatomy lessons of the Amsterdam Guild of Surgeons

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Chapter 1 provides a general introduction of the organization of the Guild of Surgeons in Amsterdam. The guild organized anatomy lessons to teach anatomy to the surgeons and apprentices of the guild. The praelector anatomiae (lecturer in anatomy) performed anatomical demonstrations on corpses of executed criminals in the Theatrum Anatomicum in Amsterdam. During the 17th century, the anatomy lessons evolved into major public events with hundreds of spectators. In the 17th and 18th centuries, the Surgeons’ Guild commissioned well-known Dutch painters for portraying their governors and members. The famous series of group portraits for the Surgeons’ Guild were intended to commemorate the praelectores and the guild members. The theme ‘anatomy lesson’ was incorporated in these group portraits. In fact, the paintings were carefully composed group portraits, which were not intended as true representations of the anatomical demonstrations that were performed in the Theatrum Anatomicum of the surgeons. These masterpieces were displayed on the walls of the guild room during the 17th and 18th century. Today, the paintings are exhibited in the Amsterdam Museum and the Royal Cabinet of Paintings Mauritshuis in The Hague. The chapter ends with the aims and outline of this thesis in connection with the anatomy lessons of the Amsterdam Guild of Surgeons.

In chapter 2, surgical training is described from a historical perspective. Going back about 350 years in time, what were the requirements to become a qualified surgeon at that time? Amsterdam was one of the first cities in Europe where the educational requirements for surgeons were recorded in the guild regulations. Based on the original guild regulations and registers of the exams, we assessed the training, master-exams and surgical diplomas of the Amsterdam Guild of Surgeons. Surgeons were trained in a master-apprentice relationship under the guidance of a master surgeon, usually in a surgeon’s shop. The lectures given by the praelector anatomiae in the Theatrum Anatomicum and the Hortus Medicus, were part of the educational program of the guild. The surgical training was completed with the ‘meesterproof’ (master-exam), an ultimate test of competence. Recently, surgical training in the Netherlands has changed.
with an emphasis on the assessment of the trainees’ skills in the surgical curriculum. From that point of view, a reintroduction of a modernized version of the master-exam would be of interest.

**Chapter 3** deals with *The Osteology lesson of Sebastiaen Egbertszn*, painted in 1619. Egbertszn (1563–1621) was portrayed while giving an osteology lesson on a skeleton of an executed pirate. ‘Osteology’, derived from the Greek words *osteon* (bone) and *logos* (knowledge), is defined as the study of bones and skeleton. Osteology was traditionally very important in surgical training and provided the basis for development of current orthopaedics and traumatology. The knowledge of osteology has been preserved for centuries in anatomical atlases, reports of surgical exams and surgical textbooks. We present an overview of some authoritative works on osteology of Vesalius, Bidloo, Cheselden and Albinus, which were related to anatomical dissections and/or surgical education. Some of these early illustrations of bones and skeletons should be considered a special category of art with a strong allegoric reference to the ultimate fate of mortality. Osteology extended beyond anatomical dissections and atlases. An evaluation of the Dutch master-exams revealed the importance of osteology in surgical training and examination. Knowledge of osteology was invaluable for surgeons in their daily practice because of its direct implications in fracture treatment. We believe that education by performing anatomical dissections still has a place in surgical training in order to develop sufficient feeling with the human tissues, anatomical variations and to train spatial aptitude. We suggest a reappraisal of anatomical dissections as was propagated by our early predecessors, preferably in the setting of a skills lab activity.

When standing in front of *The Anatomy Lesson of Nicolaes Tulp* (1632), the attention of the spectator is immediately focused on the dissected forearm in this world-famous painting. **Chapter 4** answers the question whether Rembrandt painted the dissected arm correctly. Rembrandt was known for his almost photographic painting technique, and therefore many people who were looking at this painting probably dealt with the same question before. The anatomical structures of the dissected arm shown in the painting, have been discussed in several papers over the last decades. However, these papers have not led to a consensus on the accuracy of the dissected arm so far. In fact, most assumptions and conclusions in medical and art-history literature were based on a comparison of the painting with anatomical atlases. We dissected a forearm of a cadaver in the same position and
compared that with the dissected forearm on Rembrandt’s painting. We concluded that Rembrandt correctly painted the medial epicondyle as the origin of the flexor muscles. However, our analysis established four anatomical differences between the painting and the real anatomical structures of the forearm. The possible explanations for the observed anatomical differences are discussed.

Chapter 5 deals with *The anatomy lesson of Jan Deijman* (1656). The origin, accuracy, and symbolic significance of the anatomical structures in this second ‘anatomy lesson’ painted by Rembrandt, are elucidated. Unfortunately, a large part of Rembrandt’s masterpiece was destroyed by fire at the beginning of the 18th century. Still visible, however, is how Deijman (1619–1666), praelector of the guild, performed an anatomical dissection of the cerebral membranes. We investigated why this extraordinary theme was chosen for this anatomy lesson. We performed an anatomical dissection of the brain and cerebral membranes in a corpse, and compared our observations with Rembrandt’s painting. On the painting, Deijman was depicted while trying to lift and rotate the falx cerebri. In reality, we found it was impossible to lift and turn around the falx as Deijman did. The question arises why Rembrandt wanted to show us the shape of the falx cerebri? We think the sickle-shaped falx probably represents a ‘memento mori’ motive in the painting. A sickle or scythe is the instrument used by ‘Death’ to cut down human life. We presume that the ‘human scythe’ in the form of the falx cerebri alludes to the transient nature of human life, which was a proper theme in the Surgeons’ Guild.

In chapter 6, we focus on the anatomical background of *The anatomy lesson of Frederik Ruysch* (1670). The painting is considered a group portrait to commemorate the guild officials. This masterpiece was not intended as an exact representation of the public anatomy lesson Ruysch delivered on March 29, 1670. In fact, he was portrayed while dissecting the inguinal lymph nodes with the purpose of highlighting his pioneering work on lymphatic anatomy. By assessing the original collected works of Ruysch (*The complete anatomical, medical and surgical works of Frederik Ruysch*), we investigated his early contributions to the understanding of the lymphatic system. He was internationally renowned for his great dissection skills and innovative preservation techniques of anatomical specimens. The lifelike appearance of the corpse in the painting attested to Ruysch’s preservation methods, by which he managed to virtually “resurrect” his anatomical specimens from death. Frederik Ruysch (1638–1731)
proclaimed that he was one of the first, who dissected, preserved, and demonstrated the delicate lymphatic valves. He clarified and illustrated carefully how he, based on his anatomical experiments, came to his conclusions concerning the lymphatic anatomy and fluid circulation. This painting pays tribute to Ruysch’s work on lymphatics, which is of renewed interest to surgeons today in the context of lymphatic imaging for the detection of metastases in oncology patients.

**Chapter 7** discusses the significance of the anatomical subjects, depicted on the second *Anatomy lesson of Frederik Ruysch* (1683). Ruysch was portrayed while performing a dissection of a child. Five governors of the Surgeons’ Guild and his son Hendrik, who is holding a fetal skeleton, are standing next to him. The painting was intended as a group portrait, and not as an exact representation of a recorded anatomical demonstration. An anatomical dissection on the corpse of a newborn, instead of an executed criminal, was a new element in the series of group portraits of the Surgeons’ Guild. To unravel the story behind this painting we investigated Ruysch’s original works, paying special attention to his reports on human development, stages of pregnancy, fetal and placental blood circulation, and his involvement in obstetrical education of midwives. A grant awarded by the Collegium Chirurgicum Neerlandicum made it possible to visit the Peter the Great Museum of Anthropology and Ethnography (Kunstkamera) in St Petersburg to study Ruysch’s original, over 300-year-old anatomical specimens. We identified and discussed some well-preserved anatomical specimens, for instance of injected placentas and fetal skeletons, which could be traced back to the anatomical objects depicted on the painting.

In **chapter 8**, we assessed the anatomical collection of Frederik Ruysch, which has been housed for over 300-years in the Kunstkamera in St Petersburg. It is one of the oldest and best-preserved anatomical collections in the world. Ruysch was one of the first physicians who succeeded to preserve anatomical specimens. By injecting the blood vessels of dissected body parts with a colored, wax-like substance, Ruysch managed to maintain the consistence and life-like appearance of his anatomical specimens. Initially, the collection consisted of at least 2000 specimens, of which approximately 900 have remained in the museum today. Over the past centuries, the anatomical specimens were repotted, some of them were lost, and others were rearranged. Ruysch’s original descriptions of all specimens still exist, but unfortunately, it is unknown which de-
scription belongs to which specimen. We sought to combine the original descriptions of Ruysch with the corresponding anatomical specimens in the collection of the Kunstkamera, in order to understand the methods used by the dissector Frederik Ruysch. The specimens can be roughly subdivided in decorative/allegoric, educational and ‘scientific’ anatomy pieces. Ruysch regularly used his anatomical specimens to demonstrate specific anatomical details for students and to discuss anatomical issues with contemporary physicians. The real objective of several anatomical specimens was exposed by matching them with the corresponding descriptions left to us by Ruysch. After all, the collection of anatomical preparations of Frederik Ruysch was in many ways unique in his era.

In chapter 9, we describe how the anatomist, Petrus Camper (1722–1789), unravelled the anatomy and etiology of inguinal hernias by performing anatomical dissections on corpses of children and adults in the Theatrum Anatomicum in Amsterdam. He was portrayed on one of the group portraits of the Surgeons’ Guild as the praelector anatomiae. We studied Camper’s original treatises and anatomical atlases, which were accompanied by detailed, self-drawn illustrations of the inguinal canal. Camper’s anatomical observations render us an accurate description of the *processus vaginalis peritonei*. He associated his anatomical observations with the pathogenesis of inguinal hernias, and refuted the ancient concept that a hernia was caused by a ‘rupture of the peritoneum’. Camper even designed a truss for the treatment of inguinal hernias. The ‘Truss of Camper’ was much acclaimed both nationally and internationally. Petrus Camper made a significant contribution to the knowledge and treatment of inguinal hernias in the mid-eighteenth century.

In chapter 10, we discuss how Petrus Camper investigated the anatomy of the upper extremity by performing dissections on human corpses in the Theatrum Anatomicum in Amsterdam. Based on his anatomical observations, he published in 1760, an impressive anatomical atlas of the anatomy and pathology of the arm and hand. We translated the Latin captions of Camper’s anatomical illustrations and analyzed the contents of his original works on anatomy. Until today, Camper’s name is associated with the eponym *chiasma tendinum of Camper*. The *chiasma tendinum* is defined as the intersection of the flexor digitorum profundus and superficialis tendons in the fingers, which is considered an essential anatomical structure for the gripping function of the hand. The origin of the eponym *chiasma tendinum of Camper* could be traced back to Camper’s anatomical
descriptions and drawings. The high quality of the anatomical illustrations and the relationships Camper established between the anatomical, functional, and pathological features of the arm and hand contributed to a better understanding of the upper extremity in the mid-eighteenth century.

In **chapter 11**, we present an analysis of the anatomical atlas of Govard Bidloo (1649–1713), entitled *Ontleding des Menschelijken Lichaams* (Dissection of the Human Body) (1690). Govard Bidloo was trained as a surgeon at the Amsterdam Guild of Surgeons. As a governor, he was depicted on a group portrait of the guild officials in 1679–1680. Going back to the original sources, we studied his anatomical atlas while paying special attention to his anatomical illustrations of the arm. Bidloo stated that his work was based on his observations during anatomical dissections and that it was intended for the purpose of education. His anatomical atlas was the fruit of a successful collaboration between a physician and an artist. Bidloo commissioned the talented artist Gerard De Lairesse (1640–1711) to illustrate his anatomical atlas. De Lairesse, in a masterly fashion, managed to capture the findings of Bidloo’s anatomical dissections in his drawings. These anatomical illustrations evolved into a special category of art, in which the artistic touch of the illustrator is unmistakably present. From a historical perspective, anatomists and artists heavily relied on each other in their efforts to extend the knowledge of anatomy back in the 17th century.

**Part II**

**Chapter 12** discusses the well-preserved collection of 17th and 18th century guild tokens of the Amsterdam Guild of Surgeons. This collection of Dutch ‘medical heritage tokens’ is the largest and most diverse collection of surgeons’ tokens available worldwide. The collection of tokens issued by the surgeons of Amsterdam consists of 230 pieces today. Sound knowledge of the function of these tokens is hardly available. Several personal tokens of surgeons, depicted on the famous series of group portraits of the Surgeons’ Guild, have been preserved. We looked into the tokens, which belonged to these surgeons on the paintings, and analysed their specific functions. The surgeons used the tokens to regulate the rights and obligations within the guild. Based on their function, we recognize the following categories of tokens: attendance tokens, access tokens, funeral tokens,
trainee tokens, and tokens of honour. The tokens left to us represent a unique heritage of the Amsterdam Guild of Surgeons.

In chapter 13, we focus on the coats of arms of the Amsterdam Guild of Surgeons. The guild room and anatomy theatre of the surgeons were located in the ‘Waag’, the former ‘weig house’ of the city of Amsterdam, which still is an iconic building dominating the Nieuwmarkt in Amsterdam. The dome of the Theatrum Anatomicum is decorated with 84 painted coats of arms of the guild officials. One of the coats of arms was not related to a surgeon governor, but was designated as the ‘Segel van ‘t Chirurgijns Gilde’ (Seal of the Surgeons’ Guild). The governors of the guild intended to eternalize their contributions to the surgical community by showing their coats of arms in the dome of the anatomy theatre. Several surgeons, whose coats of arms were depicted in the dome, were identified as portrayed on one of the group portraits of the Surgeons’ Guild. The coats of arms painted in the dome are considered an alternative, cheaper method of commemorating the governors, instead of the more expensive group portraits. The coats of arms that still decorate the beautifully restored dome of the former anatomy theatre are a testimony of the rich history of the Surgeons’ Guild.

In chapter 14, we conclude this thesis with some reflections on contemporary events related to the anatomy of the human body. The fascination for anatomy and its meaning to life and death continues to provide an inexhaustible inspiration for surgeons, artists, and laymen.