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ANATOMY IN THE PAINTING OF REMBRANDT HARMENSZOOM VAN RIJN

Abstract: Works of art have a substantial impact on viewers not only because of the beauty of the image but also because of the dominance of the decisive moment they express. Rembrandt Harmenszoon van Rijn managed with his group portrait *The Anatomy Lesson of Dr Nicolaes Tulp* to draw viewers into the scene of dissection of a body thanks to the dynamics of the painted characters. At the beginning of the 16th century, the practice of public autopsies spread throughout Europe. In 1555, King Philip II granted the Guild of Surgeons in Amsterdam the privilege of dissecting executed criminals for educational and scientific purposes. Dissections were performed once a year during the winter months to prevent rotting and decomposition of corpses, and the procedure itself often lasted several days. Dr Nicolaes Tulp performed the autopsy of a hanged convict in 1632, which Rembrandt immediately painted. With this piece, the artist presented the beginning of a new pedagogical approach to teaching anatomy. The picture represents Dr Nicolaes Tulp instructing seven onlookers as he is dissecting a hand and showing the flexor digitorum superficialis.

Key words MeSH: Anatomy, Dissection, Art

Non MeSH: Rembrandt, Nicolaes Tulpe

Development of the Guild of Surgeons in the Netherlands

Until the first half of the 14th century, educated doctors or *doctores medicinae* had mere theoretical knowledge of surgery, which they rarely applied practically in their daily work. As a craft, surgery was reserved more for trained barbers who did not have the necessary theoretical knowledge at that time. During the second half of the 14th century, individuals in the Netherlands embarked on surgical treatments. The initial period of such a system of surgeon education included both trained doctors and barbers. A few decades later, at the beginning of the 15th century, surgeons organised themselves into guilds, as did the other medieval European artisans.

Guilds were the organisations that gathered individuals of the same profession who were obliged to join the respective guild. The guild, as an organisation, protected the interests of its members. The first Dutch Guild of Surgeons was formed in 1466 in Leiden, while the guild in Amsterdam was formed in 1497 [1,2]. After establishing the Guild of Surgeons in Amsterdam, its members compiled the rules and regulations published in 1736 entitled “*Privilegien, willekeuren en ordonnantien, berebetten het Collegium Chirurgicum Amstelaedamense*”. The rules and regulations clearly defined surgeons’ obligations, including five years of education and training, the final exam, and how a surgeon and his student interacted. The relationship between a teacher and a student had to be modelled based on the relationship between a master and an apprentice. One of the essential educational elements was attendance at anatomy classes organised by the competent Guild of Surgeons [3].

Anatomy lessons in the Netherlands

The first public anatomy class in the Netherlands was the dissection performed in 1550 in Amsterdam’s old convent of St. Ursula and the seat of the Guild of Surgeons was in Amsterdam as well [4]. In 1555, King Philip II granted permission to the Guild of Surgeons in Amsterdam to publicly dissect a human body exclusively for educational and scientific purposes. After receiving the permission, surgeons dissected one body a year. Such public dissections were performed during several consecutive days in the winter period to avoid the rapid decay of the tissue, which would prevent the unbearable smell of the corpse and the rapid loss of the morphological characteristics of the organs and the body [5]. It would take several decades to increase the number of bodies the Guild of Surgeons could dissect. During that early period of public dissections, only the bodies of death row inmates were allowed to be used. The course of public dissections and anatomy classes was regulated by the rulebook published in 1606 [1,6].

The place of autopsy of the Guild of Surgeons in Amsterdam was moved several times until, they got their final position in the De Waag building at the end of 1691, where a suitable amphitheatre was built (Figure 1).



Fig. 1. De Sint-Anthonis Waag, 1860. Drawing by Johannes Jacobus Antonius Hilverdink [7].

This building housed several guilds, including bricklayers, painters, surgeons, and blacksmiths. The building included the amphitheatre in the central part, the rotating dissecting table around which concentric wooden benches were arranged in several rows. The first row of benches with chairs was reserved for the members of the City Council, the members of the “Collegium Medicum”, and surgeons aged fifty and older. The second and third rows were reserved for doctors, the members of the Board of the Guild of Surgeons and masters of surgery who had reached fifty years of age. The fourth, fifth and sixth rows were reserved for young surgeons. The seventh and eighth rows were reserved for the students of the Guild of Surgeons and citizens with enough funds to pay for the admission to a public anatomy class. This amphitheatre was in use until 1869 [1].

During the period of the formation of the Guilds of Surgeons, the teaching of anatomy had the methodology based on the fact that the leading dissector sat at his chair far above the body, reading the literature aloud, while a trained technician performed the physical part of the dissection. After the formation of the Guilds and the adoption of their rules, the role of dissectors was performed by the *Praelectores anatomiae*, who obtained a doctor's degree and were appointed by the competent Guild of Surgeons to teach anatomy. These doctors were precious members of society in their city, and some of them often became mayors or held some other vital function

in the city's administration. Maarten Janszoon Coster was appointed the first *Praelector anatomiae* in the Amsterdam Guild of Surgeons in 1578 [8]. The newly appointed *Praelector anatomiae* began with a completely different work methodology, teaching his audience by performing the physical part of dissection by himself. During the dissection, it was not allowed to walk around the amphitheatre, talk or interrupt the lecturer in any way [3].

To immortalise his essential figure in the education of many generations of doctors, almost every *Praelector anatomiae* commissioned his portrait at the moment of the dissection of the body. In Amsterdam, these paintings were exhibited on the first floor of the De Waag building in the room that was the meeting place of the guilds. After Napoleon's conquests and the dissolution of the Guild of Surgeons, part of the paintings ended up in the Association of Surgeons' Widows, and some were sold to collectors [4,6,9]. The first in a series of such images is the "Anatomy Lesson of Dr Sebastiaen Egbertsz de Vrij", completed in 1603 painted by Aert Pietersz. A decade and a half later, more precisely in 1619, Thomas de Keijzer presented the same anatomist during another dissection. Dr Johan Fonteijn was the next *Praelector anatomiae*, who is pictured giving an anatomy lesson in 1626. Rembrandt van Rijn painted the most famous picture with this theme in 1632, featuring Dr Nicolaes Tulp as its central figure. Two decades later (1656), the same artist painted Dr Johannes Deijman during a brain dissection. Afterwards, the portraits of Dr Frederik Ruysch during dissection were painted by Adriaen Backer in 1670. The same doctor's dissection of a newborn was painted by Johan van Neck in 1683. Dr Willem Roëll's anatomy lesson was painted by Cornelis Troost in 1728, while the epoch of group portraits during dissection was concluded in 1758 when Tibout Regters painted Prof. Petrus Camper dissecting a corpse in the presence of his colleagues [1].

Dr Nicolaes Tulp *Praelector anatomiae*

Nicolaes Tulp was born as Claes Pieterszoon in Amsterdam on October 9th, 1593, in a family involved in the linen trade. When he was 17, he studied medicine at the University of Leiden. His most influential teacher was Pieter Pauw (1564-1617), who was among the first one to perform dissections in the Netherlands [10]. Dr Nicolaes Tulp graduated from the Medical School after successfully defending his dissertation "*De cholera humana*". After that, he returned to Amsterdam and began his own medical practice.

During his first years of practising the medical profession, since he found the original version of his name, Claes, to be harsh and voiceless, he started using the name Nicolaes. He also changed his surname Pieterszoon to Tulp, alluding to a tulip flower he chose as his symbol. When Dr Tulp adopted the surname, tulips were scarce plants that arrived in the Netherlands via sailors. The first bulbs were planted at the University of Leiden, attended by Dr Tulp himself. It is unknown whether he did it because he compared his value and rarity with tulips [11].

What is known is that the doctor quickly developed his practice and was a famous doctor in Amsterdam. The price of his work went to such an extent that patient's

relatives had to send a cart with which Dr Tulp would come to the patient. In addition, Dr Tulp was engaged in scientific research and writing. “*Observationes Medicae*” is cited as his capital work in which he recorded and drew sketches of his 231 observations of unusual medical conditions such as hydrocephalus or conjoined twins (Figure 2). In that part, Dr Tulp also deals with anatomy, describing in detail the ileocecal valve named after him. The book was printed in 1641 and had three more editions in the next 100 years [12].

Interestingly, Dr Tulp was also involved in politics. He entered the Municipal Council of Amsterdam in 1622. As he served in the Council as a permanent member, he often resolved local court disputes, also acted as the supervisor of Amsterdam Bank, and the city treasurer. When he was thirty-nine years old (1653), he was elected the mayor of Amsterdam. He performed the function of the mayor in four mandates. Dr Nicolaes Tulp died in The Hague on September 12th, 1674. [13].



Fig 2. A representation of Siamese twins from the *Observationes Medicae* [14].

“The Anatomy Lesson of Dr Nicolaes Tulp” painted by Rembrandt van Rijn

The Amsterdam Guild of Surgeons made an illogical choice when they asked Rembrandt van Rijn to immortalise Praelector anatomiae Dr Nicolaes Tulp dissecting the body during a public anatomy class. At that time, Dutch painting was dominated by Thomas de Keyser and Nicolaes Pickenoy, while, unlike them, Rembrandt was a novice painter who was only 26 years old. However, Rembrandt had a strong patron,

the art dealer Hendrick van Uylenburgh, who recommended the artist to the Amsterdam Guild of Surgeons. The artist at the time was a prominent painter in his patron's studio.[12].

Rembrandt van Rijn immortalised the life-size dissection of the body of Aris Kindt, the criminal hanged the night before, by Dr Nicolaes Tulp on a canvas measuring 216.5 x 169.5 cm.



Fig. 3. The Anatomy lesson of Dr. Nicolaes Tulp by Rembrandt. (published with permission from Mauritshuis, The Hague) [12].

Due to a large number of petty thefts and violence, Kindt was forbidden to approach his hometown Leiden [15]. In January 1632, Kindt stole a cloak from a wealthy man, for which he was arrested, taken into custody, and hanged on January 31st of the same year [16]. Dr Tulp is the central figure sitting on the right side of the composition. The body of Aris Kindt occupies the central part of the composition and is placed diagonally, in black and white tones, and all its parts are exposed except for the pelvic girdle. Around Dr Tulp and Aris's body, seven other men are represented on the canvas who additionally paid Rembrandt to paint their portraits on his work [9]. In addition to the play of light, contrast and colour, Rembrandt succeeded in painting the fa-

cial expressions of the dissection participants to show their emotional state at that moment. In this way, the artist created a real theatrical scene instead of plain stiff figures.

The painting "The Anatomy Lesson of Dr Nicolaes Tulp" was restored between 1996 and 1998. During the restoration, the artwork was scanned to gain insight into the stages of creating this work of art [9]. Middelkoop et al. state that the painting techniques Rembrandt used during that analysis were also determined. Based on the analysis, Rembrandt shaped the painting on the canvas, changing the composition several times. During the first drawing, the painter presented Frans van Loenen, whose figure is at the top, with a black hat on his head. However, during the second act of painting, the painter left out the black hat, which in the final image is only worn by Dr Tulp as the composition's central figure and the autopsy's performer. In the background of the piece is a figure holding a bundle of papers on which Rembrandt, during the first painting, showed the hand's anatomy in the form of drawing. After the restoration of the picture during the 18th century, the anatomical illustration was overdrawn with a list of the names of the persons represented on the canvas. During the second restoration, the list of the names was partially removed, so Rembrandt's original drawing of the hand's anatomy on a sheaf of papers was again visible.

In the beginning, Rembrandt painted the left dissected hand in a slightly higher position than it is presented in the final painting. The artist decided to lower the dissected arm, as the realistic representation of the forearm muscles would be difficult to present in that position. In the picture, Dr Tulp raises and pulls the flexor digitorum superficialis towards the upper arm, thus wanting to tighten the muscle's tendons, which would lead to the flexion of the fingers, thereby representing its function. The right arm was amputated in the first image, while in the final version, the right arm is connected to the torso. In addition, the right hand appears shorter than the left one [6,11,12]. The thorax of the corpse seems enlarged in the anterior-posterior diameter, indicating that Aris probably had a deformity of the sternum, while the neck is not even represented, and the head appears to be pinned to the upper opening of the thorax [17].

The flexor digitorum superficialis is attached to the medial epicondyle of the humerus and to the coronoid process of ulna with its muscle body. Its tendons are attached to the middle phalanx of hand of the fingers of the hand. [18]. The subject of controversy is the impression that in the Rembrandt's painting, the flexor digitorum superficialis attaches its muscular body on the lateral epicondyle of humerus. Ijpma et al., after an experiment on a cadaver, supported the accuracy of the position and attachment of the muscles in the picture, claiming that the forearm is extended and in supination. At the same time, the elbow joint rests on the trunk, due to which the lateral epicondyle of humerus is directed outward and downward and is not visible in the picture. The medial epicondyle of humerus is directed inward and raised forward [5]. The order of dissection can also be considered as the lack of the painting. The dissections performed at the time of Rembrandt began with the opening of the trunk, while the extremities were dissected in the final stage. The reason is the rapid decay of the parenchymatous organs in the trunk, which are most prone to rotting. Nevertheless, the composition shows the dissection of the hand while the rest of the body is still intact.

Conclusion

Trained doctors had only theoretical knowledge of surgery until the first half of the 14th century. During the second half of the 14th century, individuals in the Netherlands embarked on surgical treatments. At the beginning of the 15th century, surgeons organised themselves into guilds. In this sense, public dissections were very important for the training of future surgeons. In the 16th century, public dissections of a human body were allowed, but only for educational and scientific purposes, and only the bodies of those sentenced to death. The course of public dissections and anatomy classes was regulated by the rulebook published in 1606. After receiving a license, surgeons could dissect one body per year. The anatomy teaching methodology was based on the leading dissector sitting at his chair far above the body, reading the literature aloud. At the same time, the physical part of the dissection was performed by a trained technician. To immortalise his essential figure in the education of many generations of doctors, almost every *Praelector anatomiae* commissioned his portrait at the moment of dissection of the body. In Amsterdam, these paintings were exhibited on the first floor of the De Waag building in the room that was the meeting place of the guilds. That was extremely important because dissections could not be performed often enough, so pictures of those events were rare educational material. Rembrandt van Rijn presented a life-size dissection of the body of Aris Kindt, the criminal hanged the night before, by Dr Nicolaes Tulp. Rembrandt managed to paint the facial expressions of the dissection participants to show their emotional state at that moment. With this piece, the artist presented the beginning of a new pedagogical approach to teaching anatomy, which was extremely important considering the low frequency of such events.

Rezime

Školovani lekari su do prve polovine XIV veka imali samo teorijsko znanje iz hirurgije. Tokom druge polovine XIV veka pojedinci su se u Holandiji počeli obučavati za hrurški rad. Nekoliko decenija kasnije, početkom XV veka hirurzi su se organizovali u cehove. U tom smislu javne disekcije su bile veoma značajne za obuku budućih hirurgu. Početkom XVI veka širom Evrope se proširila praksa javnih obdukcija. Kralj Filip II je 1555. godine cehu hirurgu u Amsterdamu dao privilegiju disekcije pogubljenih kriminalaca u nastavne i naučne svrhe. Disekcije su se vršile jednom godišnje tokom zimskih meseci kako bi se sprečilo truljenje i raspadanje leša, a sam postupak je često trajao nekoliko dana.

Kako bi ovekovečili svoju važnu figuru u edukaciji mnogih naraštaja lekara, skoro svaki *Praelector anatomiae* je naručio vlastiti portret u trenutku disekcije tela. U Amsterdamu su te slike bile izložene na prvom spratu zdanja *De Waag* u sobi koja je bila mesto susreta esnafa. To je bilo izuzetno važno i zbog toga što disekcije nisu mogle biti dovoljno često izvođene pa su slike tih događaja bile redak obrazovni materijal.

Umetnička dela imaju snažan uticaj na posmatrača ne samo zbog lepote slike nego i zbog dominantnosti snažnog trenutka koji izražavaju. Rembrandt Harmenszoon van Rijn je uspeo svojim grupnim portretom *Čas anatomije dr Nicolaes Tulpa* da uvuče posmatrača u scenu disekcije tela zahvaljujući dinamici naslikanih likova. Ovo delo nije izražaj običnog naturalističko-realističkog prikaza, niti je naslikano kako bi se stvorio izložbeni

predmet. Scena je dramatzirana kako bi se i na taj način pridoneo značaj naručiocu slike, što je u skladu sa običajima te epohe. Dr Nikolas Tulp je obdukciju obešenog osuđenika izvršio 1632. godine, što je Rembrandt odmah naslikao. Umetnik je, ovim delom, uspeo da predstavi i početak novog pedagoškog pristupa u nastavi anatomije. Na slici je predstavljen dr Nikolas Tulp kako podučava sedmoricu posmatrača dok vrši disekciju ruke i prikazuje površnski pregibač prstiju šake. Imena oduševljenih posmatrača su poznata, a zapisana su na papiru koji drži jedan od njih.

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