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IN HONOR OF DR. NIKOLAES TULP, "I CONSUME MYSELF SERVING OTHERS"

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Abstract

The article is devoted to the 425th anniversary of birth of the famous surgeon and anatomist Nikolaes Tulp, who was called "Vesalius of Amsterdam". Tulp was unique for his high qualities of a political leader, the true Christian who advocated salvation, the talented doctor and anatomist. A man of not noble blood, Tulp was completely "self-made person". Rembrandt, the greatest artist of the Dutch Golden Age, immortalized "The Anatomy lesson of Dr. Nikolaes Tulp" in his paintings for centuries. His major work is the practical guide "Observationum medicarum" ("Medical Observations"), published in 1641, also known as "The book of monsters" due to numerous illustrations of exotic animals, development anomalies, congenital defects, such as Siamese twins, hydrocephalic child. Tulp pioneered discussion of various medical conditions. The "Medical Observations" included the earliest very detailed description of the ileocecal valve (Tulp's valve), the Diphyllobothrium latum (fish tapeworm), the pulsations of the spleen and benefits of blood-letting and the human features of some apes.

Tulp was one of the first surgeons who proposed drainage as treatment for empyema. He also paid much attention to gallstones and kidney stones, described three methods of urethral stone removal – with the knife, hook and by suction. Among the interesting cases mentioned by Tulp, there were the hyperhydrosis, hysterical aphasia, volvulus, intestinal obstruction, gangrene, hydrocele, ascitis, incisional hernia and torticollis.

The neurological conditions and their treatment included head injury and the use of the trepan. Tulp presented the case report on the successful surgical treatment of the acute epidural hematoma applying the circular trepanation . The bone trepan lifted some bones, compressing the brain. Tulp also suspected that an intracranial blood clot could cause the compression of brain and thus without hesitations, he offered a surgery to relieve the brain.

Tulp operated lumbar tumors. One of the autopsy cases described the splitting of the spinal cord onto two halves from the level of the 12-th thoracic vertebra up to the sacral bone (diastematomyelia). Other neurologic cases found in the book included epilepsy, St.Vitus dance and hydrophobia.

Keywords: *history of medicine, Nikolaes Tulp, case reports, neuroscience, congenital abnormality.*

Contribution to medicine. Tulp's most important work is the practical guide "Observationum medicarum" ("Medical Observations") (Fig. 1) published in 1641 and dedicated to his elder son Pieter, who graduated from the medical school at the University of Leiden. The first edition, also known as "The book of monsters" because of numerous illustrations of exotic animals, development anomalies, congenital defects, such as Siamese twins and hydrocephalic child, was written in Latin and consisted of three volumes [*Di Matteo B et al., 2016*]. The second edition dated 1652, in honor of the same son, who died tragically, contained four books describing 233 cases. The popular work had six Latin editions and two translations into Dutch. The cases were systematically classi-

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FIGURE 1. *Title page of Tulp's book "Observationum medicarum" written in 1637, first published in 1641 and reissued many editions.*

fied and were arranged in in the way its done nowadays: introduction, case description, diagnosis and discussion with the presented literature from Hippocrates to XVII century contemporaries. Tulp was the pioneer in the discussion of various medical conditions. The "Medical Observations" included the earliest very detailed description of the ileocecal valve (Tulp's valve), the Diphyllobothrium latum (fish tapeworm), the pulsations of the spleen, and benefits of blood-letting and the human features of some apes [*Goldwyn RM, 1961*].

Tulp was one of the first surgeons who proposed drainage as treatment for empyema. He paid much attention to to gallstones and kidney stones, described three methods of urethral stone removal – with the knife, hook and by suction. All his practical experience served to help the young doctors in difficult cases. Severe conditions were described with details, along with the possible treatment. Among the interesting cases mentioned by Tulp, there were hyperhydrosis, hysterical aphasia, volvulus, intestinal obstruction, gangrene, hydrocele, ascitis, incisional hernia and torticollis. He was against smoking tobacco and propagated tea, which was not much in Amsterdam, as the remedy against headaches.

The neurological conditions and their treatment included head injury and the use of the trepan [*Koehler PJ, 1996*]. Though the trepanned skulls were found among the prehistoric specimens and were dated about 10.000 BC, the indications for that manipulation were not quite clear [*Van Alphen HA, 2001*]. In chapter V of his book Tulp has presented the case report on the successful surgical treatment of acute epidural hematoma using the circular trepan. The detailed description was illustrated and it served an algorithm for physicians. The case was of a navy captain who being drunk fell down and smashed his head over the pavement. Denting of the skull was pressing on the brain. Tulp suspected intracranial hematoma to be causing the compression of brain and performed the brain decompression surgery without hesitations to relieve the brain. After making a burr hole, he found the epidural hematoma and applied the maneuver that was later named after Valsalva, for preventing the swelling of the dural contents and reduction of the epidural space, "so that the brain could better rid itself of its burden" [*Van Alphen HA., 2001*]. Tulp insisted on the urgent surgical intervention in such life-threatening conditions, like severe head injury.

Tulp also paid great attention to differential diagnoses of headache types. He is referred to for a saying that in cases of severe headaches, the patient will be cured if blood or fluid is let out of his nose or ears. He also described that the patient experiences sudden headache, loss of speech, rattle in the head in stroke. He applied the bloodletting from both arms of a young man with stroke, and that appeared to be successful, and the patient recovered.

Another interesting case was that of a man with unbearable squinting headache (migraine) lasting for no more than two hours daily and making him unable to open the eyes or speak. This condition was occurred and disappeared on the fixed hours, and during the rest of the day there were no disorders in urination, pulse rate or fever. This observation is referred to as the first described case of a cluster headache in medical history [*Koehler PJ, 1993*].

Tulp differentiated between cephalalgia as occasional headache occurring, for instance, in fever, and cephalea repeated headache, for example, in the mornings or afternoons.

"Medical Observations" also includes the descriptions of hydrocephalus. Tulp performed an autopsy of the 5-year-old child who had died from hydrocephalus. The head was as big as in adults

and the child had to either sit or lie down until his death, but the father was sure of his normal mental abilities. During the autopsy, 5 pounds of fluid were removed from the skull. Tulp noted the deformed medulla, surrounding the ventricle, but he was not certain whether that was the result of the brain compression by fluid or the reason of the narrowing of the ventricle and poor drainage of fluid was the malformation of the medulla.

Two cases were devoted to the amnesia caused by the head injury as a result of the patient's fall. The patients could not remember how the event happened, one of them could not recollect his name and where he was from, and his memory did not return. Tulp tried to prove the theory, that the back portions of brain are more likely to be responsible for the memory of past events, while the centers of imagination are localized in the front areas.

Tulp operated the lumbar tumors and had at least six cases of spina bifida until 1641, and made the clear understanding of that congenital lesion [*Koehler PJ, 1996*]. One of the autopsy cases described the splitting of the spinal cord onto two halves from the level of the 12-th thoracic vertebra up to the sacral bone (diastematomyelia).

Tulp showed the significance of the cauda equina, described the paralyses of the right half of the body after the left-side injury of the skull. Although the decussation of the pyramidal tracts had not been yet revealed, Tulp described it in the "Observations". More neurologic cases found in the book included epilepsy, St.Vitus dance and hydrophobia.

However, like many representatives of the middle centuries, Tulp could not escape the delusions. The beri-beri indorum disease he treated with petroleum [*Koehler PJ, 1996*]. That disease was observed in travellers to East Indies, which was the Dutch territory at that period. Tulp studied beriberi paralysis after Jacob de Bondt (the son of Professor Geraert de Bondt of Leiden), who suffered from the disease. Alongside with his beliefs that oysters could treat tuberculosis and hare urine is useful in deafness, Tulp realized the necessity and importance of more investigations in order to enlage true knowledge to save the lives of patients.

This year we are to celebrate the 425-th year anniversary from the date of birth of the famous surgeon and anatomist Nikolaes Tulp, who was called "Vesalius of Amsterdam" [*Aflek A et al., 2009*].

Biography. Nikolaes Tulp was born on October 11, 1593 in Amsterdam in the family of a cloth merchant [*Goldwyn RM, 1961; Griffey E, 2016*]. His birth name was Claes Pietersz. He and his elder brother Dirck were sent to obtain education to the University of Leiden. Claes Pietersz studied medicine there in 1611-1614. Among the teachers who developed his talent there were famous Reinier de Bondt, Pieter Pauw and Everard Vorst. In 1614 Tulp received his MD with his work "De cholera humida" [*Koehler PJ, 1993*] under the guidence of Pieter Pauw. Then, he came back to Amsterdam and began his private practice as a doctor.

In 1622 Claes Pietersz became a member of the Amsterdam council, and Prince Maurits assigned him the city magistrate. The new position in political and social elite demanded the presence of the coat-of-arms and Claes Pietersz chose the tulip and began to use the name "Tulp". He decorated the signboard of the house with white tulip with red stripes, the expensive and popular flower in Europe. Since then, everyone knew him as Nikolaes Tulp. Later he commissioned a guilt silver beaker in the shape of a tulip with a lizard crawling up the stem. The beaker-tulip could be associated with the communal cup of the Eucharist, since the family of Nikolaes was deeply religious. In the widespread in the XVII century genre of painting Vanitas, tulip meant a symbol of irresponsible and unreasonable treatment of God-given wealth. Vanitas style was preferred amongst Netherland artists, depicting doctors. The usual attributes for the pictures served the symbols of life, inevitability of ageing and death – a skull, a rotten fruit, a fading flowers, a cups and a knife.

In 1632 Rembrandt, who was at that moment just 26, depicted the portrait of Tulp known as "The Anatomy lesson of Dr. Nikolaes Tulp" (Fig. 2). Rembrandt was a young and inexperienced artist, but it was thanks to him the portrait of Tulp was immortalized for centuries. The authors [*Aflek A et al., 2009*] were suggesting that Rembrandt expressed many symbolic religious meanings in the picture.

Along with Tulp, seven more surgeons were depicted, watching the dissection of the cadaver. Many contradictory theories appeared explaining why the limbs of the corps are unequal, why the dissection started from the forearm, though it should be according to accepted protocol: the chest

and abdomen were to be examined on the first day, the head – on the second day, the limbs on the third. As to our own version, the personality of the executed criminal should be taken into account. Adriaen Adrianson (Aris het Kint) was a thief, condemned and hung in winter of 1632. In many traditions, the right hand is for right, good jobs, the left one often makes mistakes, doing wrong things. By making his left hand longer and being dissected first, the painter meant show that the criminal was a thief and was punished for that. It is interesting that the X-ray revealed that the first idea of Rembrandt was to depict the right forearm ending with a stump [*Masquelet AC, 2005*]. Later, the complete hand appeared on its place.

Rembrandt painted the autopsy scene again in 1656. This group portrait is known as "The Anatomy lesson of Dr. Deijman" (Fig. 3) and depicts Tulp's successor Jan Deijman performing brain dissection.

As well as Rembrandt, Pickenoy also painted medical group portrait – "The osteology lesson of Dr. Sebastiaen Egbertsz" (Fig. 4).

In 1633 Nicolaes Elias Pickenoy, being grateful for the successful treatment of his sick daughter, presented one more portrait of Nicolas Tulp (Fig. 5), where the great person was depicted showing the candle and as if pronouncing the motto written below "Aliis inserviendo consumor", that means "I consume myself serving others", corresponding to the Russian idiom "shining to others I burn myself". That slogan is widely spread and used by doctors and teachers.

As Tulp became popular more and more, the Amsterdam poet and playwright Jan Zoet devoted two poems to him.

Tulp was unique for the joined in one person high qualities of the talented doctor and anatomist, the true Christian who advocated salvation, and at the same time the public figure and political leader.

In 1628 he was assighed the Praelector in Anatomy at the Surgeons Guild [*Goldwyn RM, 1961*]. That position gave him the right to control and perform public dissections of the bodies of criminals, which attracted great interest of both scientific world and high authorities. Headed by Tulp, the dissectors were competent anatomists who performed that with detailed explanation on the way. The public anatomical dissections were not just simple demonstrations but "representations of the miracles of God revealed in man, so anatomist was considered the intermediate person between the God and man" [*Griffey E, 2016*]. Moreover, the anatomy theatres were often placed in old chapels with the anatomy table in the altar position. The Leiden Anatomical theatre, established by his teacher Pieter Pauw in 1597 [*Kutia SA, Shaymar-*

FIGURE 2. *The Anatomy lesson of Dr. N. Tulp Rembrandt (1632)*

FIGURE 3. *The Anatomy lesson of Dr. Deijman Rembrandt (1656)*

FIGURE 4. *The osteology lesson of Dr. S Egbertsz Pickenoy (1619)*

Figure 5. *Portrait of N.Tulp by Nicolaes Elias Pickenoy, grateful for the successful treatment of his sick daughter in 1633.*

danova LR, 2017], where Tulp studied anatomy also functioned primarily as the chapel. By dissecting the criminals the anatomists conducted God's power of moral retribution, and that show served for scientific, educational and moral needs for society. For doctors, it served a comprehensive surgical course.

When in 1635 the plague in Amsterdam took more than 17 thousand victims, Tulp set up quarantine as the effective measure against spreading of the disease. Being impressed by useless and expensive drugs sailed by local apothecaries, he introduced a new law, according to which they all were obliged to pass an exam on Dutch pharmacopoeia "Dispensatorium" authored by Tulp, and further should be supervised by the seventy practicing doctors of the city.

Starting from 1645 Tulp was the Major of the city for four times; eight times he was the treasurer, the Member of Committee Council of the States of Netherlands; he was twice made the Supervisor of Orphans and in 1654 Nikolaes Tulp became a burgomaster. For his enormous energy and good deeds he became beloved by public.

In 1672, at the age of 79, Tulp held a "grand reception" in honor of the city. His son-in-law, Baron Jan Six, helped to organize a party for Tulp and prepared a number of surprises for the citizens [*Plessis J, 1992*]. He made it a remarkable event for the city, with rich decorations and abundant food, each guest got a silver medallion and Tulp was presented the golden one.

Tulp was happily married with Aafge Van der Voegh in 1617 [*Goldwyn RM, 1961*]. Within the eleven years of marriage she gave birth to five children. Two years later after her death in 1628, he got married again to Margaretha de Vlaming van Outshoorn, the daughter of the influential politician and wealthy businessman. He had three more children with her.

Tulp died in 1674, at the age of 81 and was buried in the New Church of Amsterdam. He had the active life, serving as a doctor, scientist, administrator, and politician. In one person he joined the religion faith and scientific approach, the high moral qualities and being rich at the same time.

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