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Anatomy lesson of the brain and cerebral membranes captured on canvas by Rembrandt in 1656

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Approximately 250 years ago, the English painter and art critic Sir Joshua Reynolds visited the Amsterdam Guild of Surgeons, and saw a fascinating collection of group portraits exhibited on the walls of their guild room. His attention was immediately caught by one of the paintings, depicting an anatomical dissection of the brain and cerebral membranes in the corpse of an executed criminal. He was obviously looking at the masterpiece painted by Rembrandt in 1656, known as *The Anatomy Lesson of Jan Deijman*. Our aim was to expose the story behind the painting by examining the original Guild documents and literature related to this extraordinary piece of art. The depicted surgeons, their teacher Jan Deijman, and the criminal record of the executed man are disclosed. The accuracy and deeper meaning of the anatomical structures of the brain depicted in the painting were assessed by comparison with the findings of a real anatomical dissection.

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Introduction

In the 17th century, Rembrandt van Rijn (1606–1669) was commissioned to paint two group portraits for the Amsterdam Guild of Surgeons. Both paintings belong to the collection of nine group portraits, made for the Amsterdam Guild of Surgeons¹. These pieces of art commemorate the praelectors anatomiae (lecturers in anatomy), governors and surgeons of the Guild. At that time, they were on display on the walls of the surgeons' guild room in the Waag (weigh house) at the Nieuwmarkt in Amsterdam. Because the main themes for these group portraits were anatomical demonstrations, they are usually referred to as 'anatomy lessons'. Rembrandt's first painting, *The Anatomy Lesson of Nicolaes Tulp* (1632), has become a world-famous masterpiece^{2–4}. The second painting, *The Anatomy Lesson of Jan Deijman* (1656), is less well known (*Fig. 1*)^{4–6}. This is probably because it was damaged by a fire in the guild room in 1723. After restoration of what was left of the painting, Rembrandt's work was put back on the wall in the boardroom of the Guild. The English painter and art critic Sir Joshua Reynolds (1723–1792) visited the surgeons of Amsterdam in their guild room in 1781. He was immediately struck by the unique art collection of the Dutch surgeons hanging on the wall, and made the following notes in his travel diary: 'Above the stairs is another Rembrandt, of the

same kind of subject. Professor Deijman standing by a dead body, which is so much foreshortened, that the hands and feet almost touch each other. He lies on his back with his feet towards the spectator. There is something sublime in the character of the head, which reminds me of Michelangelo. The whole is finely painted, the colouring much like Titian⁵. He was obviously fascinated by Rembrandt's second anatomy lesson. The painting is currently exhibited in the Amsterdam Museum in Amsterdam, The Netherlands.

In 1653, Jan Deijman succeeded Nicolaes Tulp as praelector anatomiae of the Amsterdam Guild of Surgeons. The painting depicts Deijman, standing behind the corpse of an executed criminal, performing an anatomical dissection of the cerebral membranes. The surgeon on his right-hand side is the guild assistant, Gijsbert Calkoen^{5,6}. From a sketch of the composition made by Rembrandt as a preliminary study for the painting, we know how the original painting looked before it was largely destroyed by fire (*Fig. 2*)^{5,6}. Rembrandt's drawing demonstrates that, apart from his assistant and the corpse, Deijman was surrounded by seven more surgeons. A digital reconstruction of the painting gives an impression of how Rembrandt once delivered his masterpiece (*Fig. 3*)⁵. The original painting should have measured approximately 245 × 300 cm, of which only 113 × 135 cm was left after the fire. Unfortunately, only the central part of the original painting could



Fig. 1 *The Anatomy Lesson of Jan Deijman*, painted by Rembrandt in 1656 (Collection Amsterdam Museum)

be preserved during restoration of the burned canvas. Rembrandt's sketch and the reconstruction demonstrate that the attending surgeons were standing in the semicircular gallery of an anatomy theatre. The corpse is depicted with an exaggerated foreshortening from the foot end of the dissection table^{1,5,6}. Rembrandt combined depth with a close-up view to give us the sense of standing in front of the dissection table. The view of the recumbent body reminds us of the *Lamentation of Christ*, a painting by the Italian Renaissance artist Andrea Mantegna in 1480, which Rembrandt would have been familiar with. By giving the dissected brain a prominent place in his painting, it is evident that Rembrandt made every effort to focus our attention on the anatomical demonstration of the praelector¹. After all, *The Anatomy Lesson of Jan Deijman* should be considered one of the most extraordinary historical images recording an anatomy lesson of the brain and cerebral membranes.

Jan Deijman

Jan Deijman (1619–1666) is the praelector who is standing behind the corpse and performing the anatomical dissection. Unfortunately, his face had been lost, as a result of the painting being seriously damaged by the fire. Only his torso and hands are visible in the part of the painting that has been preserved. Today, his facial expression during this anatomy lesson can only be imagined. Jan Deijman was the son of a sea captain^{1,5}. He studied medicine at the University of Leiden and then completed his PhD thesis at the University of Angers in France. After graduation, he settled as a doctor in Amsterdam. He married Mary Bass, and together they raised four children^{1,5}. Deijman was appointed inspector of the Collegium Medicum,

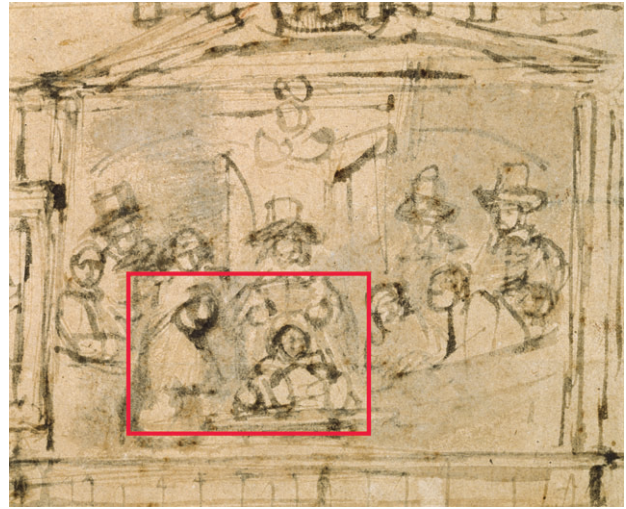


Fig. 2 Preliminary sketch of *The Anatomy Lesson of Jan Deijman* (11 × 13.3 cm), made by Rembrandt before a large part of the original painting was destroyed by fire in the guild room. Only the central part of the original painting has been preserved (indicated by a red square) (Collection Amsterdam Museum)



Fig. 3 Digital reconstruction of *The Anatomy Lesson of Jan Deijman* based on Rembrandt's preliminary drawing of the original painting. Reconstruction by Thijs Wolzak and Norbert Middelkoop (Collection Amsterdam Museum)

the board of the *doctores medicinae* (physicians) and *pharmacists*, which controlled the quality of healthcare in Amsterdam. Deijman worked as a physician in the former city hospital, the *Sint-Pieters* or *Binnengasthuis*, in the centre of Amsterdam. The hospital was not only for patients, but also offered shelter to the poor and homeless. In the event that people died in the hospital and had no relatives to take care of the funeral, the hospital physician had permission to

examine the dead body. The hospital housed a small dissection room, in which Deijman performed several autopsies to check the cause of death of his patients¹.

Apart from his activities in the city hospital, Deijman succeeded Nicolaes Tulp as praelector anatomiae of the Amsterdam Guild of Surgeons in 1653^{1,5}. He held this position for 13 years, until his death in 1666. As a praelector, Deijman was responsible for the education of surgeons in Amsterdam. He held theoretical surgical lessons every week and performed a dissection on the corpse of an executed criminal every few years. He performed his first anatomy lesson on 29 January 1656. The record of this anatomy lesson is listed in the 'anatomy book' of the Surgeons' Guild (Fig. 4)⁷. The lesson took 3 days and the revenues from the admission fee added up to 187 guilders. This 3-day event attracted hundreds of spectators; surgeons paid 6 stuivers and citizens 4 stuivers (1 stuiver at that time was equivalent to approximately €0.5 today) to attend the lesson. At the end of the lesson, Deijman received six silver spoons as a sign of appreciation for teaching the surgeons. Deijman's appointment as praelector anatomiae of the Surgeons' Guild, and his first anatomy lesson held in 1656, were reasons for the board of the Guild to have Deijman portrayed by Rembrandt, according to the tradition of his predecessors.

The surgeons

Rembrandt initially painted eight surgeons surrounding Deijman. Unfortunately, the portraits of seven of them were lost because of the fire in 1723. Nevertheless, we are still familiar with the names of the surgeons who were once part of Rembrandt's composition, namely: Dirck Vis, Klaes Fruijt, Daniel Florianus, Lourens de Langhe, Augustus Maijer, Jacob Hernij and Barend Heems^{1,5}. The surgeon standing on the left-hand side of the painting, the only one whose portrait survived the fire, is 34-year-old guild assistant Gijsbert Calkoen (1621–1664)^{1,5,8,9}. With his presence in this painting, he followed in the footsteps of his father Matthijs Calkoen, who was one of the surgeons depicted in Rembrandt's first group portrait in 1632, *The Anatomy Lesson of Nicolaes Tulp*^{1,2}. Gijsbert was trained as a surgeon in Amsterdam and completed his master examination in 1645 (Fig. 5). At the time of Deijman's anatomy lesson in 1656, Gijsbert held the position of guild assistant^{1,5}. His task was to assist the praelector during the anatomy lesson. While holding the skull cap in his left hand, he assists Deijman with performing the craniotomy. A black shroud is hanging over his left arm, which was used to cover the corpse at the end of the lesson. A few months after the anatomy lesson, Gijsbert was elected to

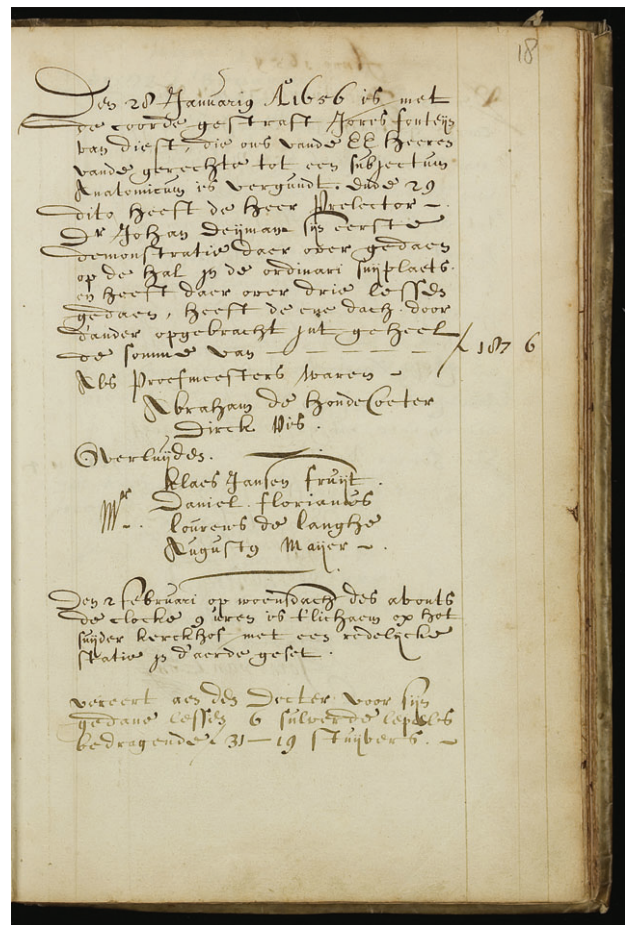


Fig. 4 Handwritten notes in the anatomy book of the Surgeons' Guild about the anatomy lesson of Jan Deijman in 1656 (Amsterdam City Archives). Translation of these original notes: *At January 28, 1656, Joris Fonteijn from Diest was sentenced to death by hanging. His body was banded over to the surgeons by the court of justice to serve as 'subjectum anatomicum'. Dr Jan Deijman performed his first anatomy lesson at January 29 in the dissection room of the surgeons. The lesson took three days. The revenues from this lesson were 187 guilders in total [equivalent to €2000 today]. The attending 'proefmeesters' (chairs of the examination board for surgical trainees) were – Abraham de Hondecoeter/Dirck Vis. The attending governors were – Klaes Jansen Fruijt, Daniel Florianus, Lourens de Langhe and, Augustus Maijer. The corpse was buried on Wednesday evening at February the 2nd at 9 pm at the southern graveyard. As a gesture of appreciation for performing the lesson, Deijman received 6 silver spoons, with the value of 31 guilders and 19 stuivers [equivalent of approximately €350 today].*

act as a governor in the board of the Surgeons' Guild. In 1658, he was appointed chair of the examination board for surgical trainees of the Guild. In that position, he was concerned mainly with preparing and conducting surgical examinations, the requirements for which were defined



Fig. 5 Gijsbert Calkoen, the assistant of Jan Deijman

precisely in the Guild regulations. He died in 1664 and was buried in the Wester-church in Amsterdam.

The corpse

The corpse lying on the dissection table (*Fig. 6*) was that of a 22-year-old man, named Joris Fonteijn (1633/34–1656)^{1,10}. After leaving his job as a tailor, Fonteijn decided to work for several years on a ship of the Dutch West India Company. He returned in 1653 from the coastal areas of North Africa and collected an inheritance of 150 guilders (equivalent to approximately €1640 today). Ending up in the city of Dordrecht, he spent all his money and started to commit thefts and burglaries. In Dordrecht he met a woman, Elsje Otte, who became his partner in crime. Her nickname was the ‘thunder-hooker’, and we can assume that she did not have the best influence on him. Fonteijn continued his criminal activities in Amsterdam. One day, he was caught red-handed, stealing a piece of cloth in a shop at the Nieuwendijk. He tried to escape, but a group of men went after him and, when they tried to grab him, Fonteijn pulled a knife and injured one of his pursuers. He was then overpowered and arrested. Fonteijn had been imprisoned several times for theft. All previous times he had been released from jail after physical



Fig. 6 Joris Fonteijn, the criminal who was sentenced to death by hanging and whose body was dissected during the anatomy lesson of Jan Deijman



Fig. 7 Detailed image of the anatomical demonstration of the brain and cerebral membranes on the dead body of the executed criminal Joris Fonteijn

punishment, but now, because of all the crimes he had committed and the fact that he was carrying a gun, he was ultimately sentenced to death by hanging on 28 January 1656. The gun was attached to the scaffold above his head as a warning to others. After his execution, his body was handed over to the Amsterdam Guild of Surgeons and used for the anatomy lesson of Jan Deijman.

The anatomy

The painting demonstrates Deijman lifting part of the cerebral membranes with his hand and forceps. He has removed the scalp and the skull cap, providing us with a

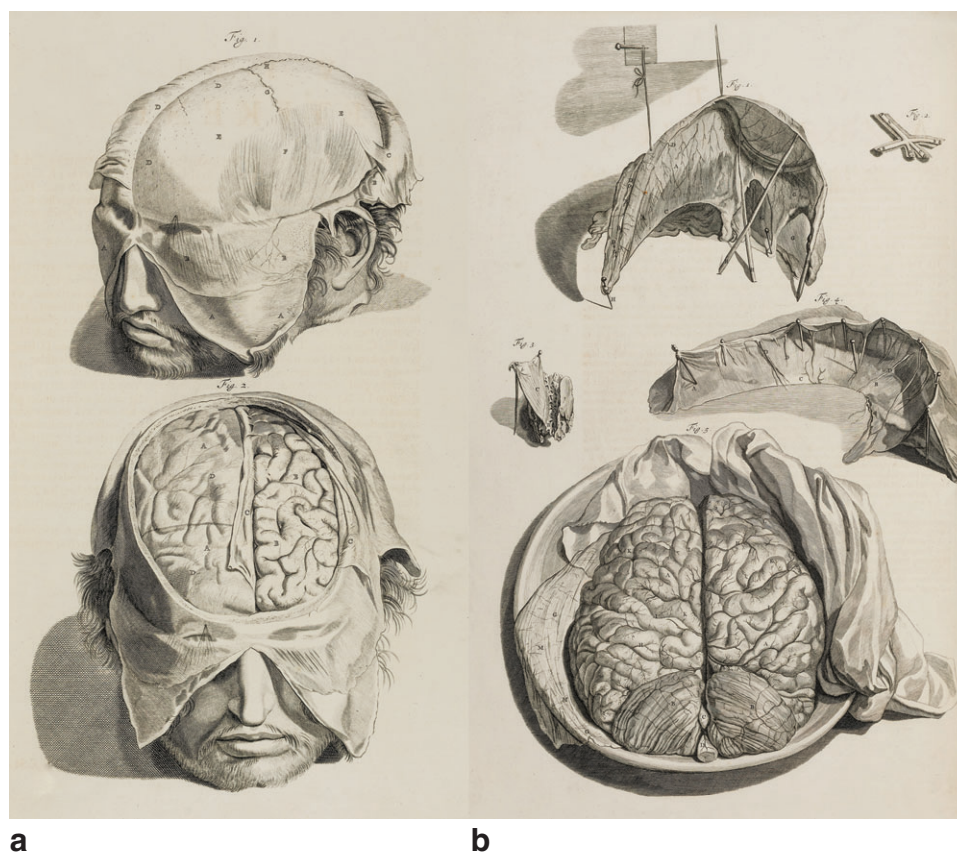


Fig. 8 Illustrations of the successive stages of an anatomical dissection of the brain and the cerebral membranes from the anatomy atlas of Govard Bidloo (1690). **a** The skin is cut into four pieces and peeled off the scalp. In the next phase of the dissection, the skull cap has been removed. The right cerebral hemisphere is still covered with dura mater. The left side of the brain is exposed after removal of the dura. The falx cerebri is located in the midline where the dura merges and descends down in the fissure between the two hemispheres. **b** In the upper image, the sickle-shaped falx cerebri is held upright with small sticks and pins. The brain is placed in a small bowl (University Library of Groningen)

glimpse of the brain of the dead man (Fig. 7). Recently, we investigated the accuracy of the anatomical structures shown in the painting by comparing these with the real anatomical structures of a brain that was removed at an autopsy and preserved for scientific purposes¹¹. During this procedure, the scalp was incised and stripped off the skull. Subsequently, the skull was opened by performing a craniotomy. After removal of the skull cap, the dura mater was exposed. An illustration from the anatomical atlas of Govard Bidloo (1649–1713), entitled *Ontleding des Menschelijken Lichaams (Dissection of the Human Body)*, gives an impression of the appearance of the dura mater (Fig. 8a)¹². Bidloo was trained as a surgeon at the Amsterdam Guild of Surgeons in 1670⁹. He had not attended the anatomy lesson of Jan Deijman, but had visited the lessons of his successor, Frederik Ruysch. Later in his career, Bidloo became professor of anatomy in Leiden. In his new anatomical

atlas, Bidloo clearly shows that the dura mater descends in a fissure between the cerebral hemispheres where it forms the falx cerebri. This part of the dura curves and tapers while approaching the base of the brain, and resembles the shape of a scythe. Falx cerebri is Latin for ‘sickle or scythe of the brain’. Accordingly, Bidloo called this anatomical structure the ‘zeissenvlies (scythe membrane)’ (Fig. 8b)¹².

The painting shows that Deijman has lifted the falx cerebri. Before he was able to lift it, he had to cut the dura along the edge of the falx. He divided the dura into four quadrants and peeled them away in order to expose the brain. The impressive colour reproduction of the brain in Rembrandt’s painting corresponds very well with the real appearance of the brain¹¹. Therefore, it is likely that Rembrandt had examined an anatomical specimen of the brain before painting this anatomy lesson. The painting suggests that Deijman not only lifted the falx, but also tried

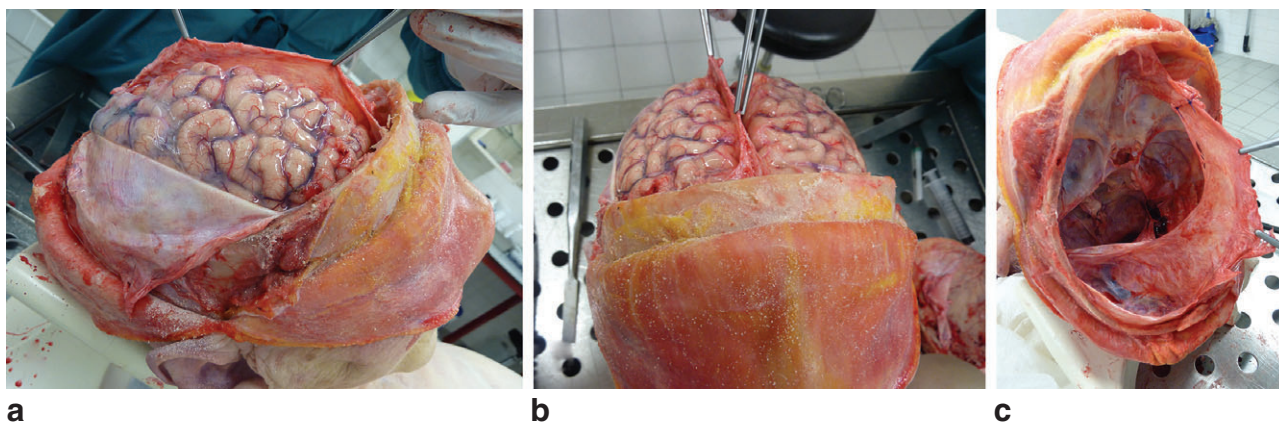


Fig. 9 Successive stages of an anatomical demonstration of the brain and the cerebral membranes. **a** Side view of the brain after craniotomy. The dura is cut along the edge of the falx cerebri and folded back. Subsequently the falx is lifted with two forceps. **b** Frontal view of the brain while the falx is lifted with two forceps. It is not possible to turn the falx around, as Deijman did in the painting, because it is attached to the skull base. **c** The sickle-shaped falx cerebri is presented with two forceps. The anterior side of the falx and the tentorium cerebelli were cut in order to remove the brain. The anterior aspect of the falx was reattached with two sutures

to turn it around on its axis. It seems as though he wanted to show the side view of the falx to the spectators of the painting. In reality it is not possible to lift the falx as far above the brain and to rotate it in the way Deijman did (*Fig. 9a,b*)¹¹. To demonstrate the shape of the falx, it had to be detached from the base of the skull. The anterior part of the falx is attached to the skull, and the posterior part turns into the tentorium cerebelli. After both structures were transected and the brain removed, the scythe or sickle shape of the falx cerebri became apparent (*Fig. 9c*)¹¹.

Perspective

An anatomy lesson in the 17th century usually started with dissection of the perishable organs of the abdomen and thorax, followed by the brain; the extremities were the last to be dissected. According to the painting, Deijman seems to have followed the successive stages of a traditional anatomy lesson and first dissected the abdominal organs. However, the brain has already been exposed while the thorax remains untouched¹. It is probably no coincidence that Deijman is showing the sickle shape of the falx cerebri. He lifted the falx and tried to turn it around on its axis, but it is impossible to lift the falx and turn it in the way Deijman did for the painting¹¹. Rembrandt's painting was not intended to capture a real scene from Deijman's anatomical dissection. Rather it represents a carefully assembled group portrait to commemorate the praelector and surgeons.

The anatomical image of the brain from the work of the famous anatomist Andreas Vesalius (1515–1564) is often regarded as the source of inspiration for Deijman's

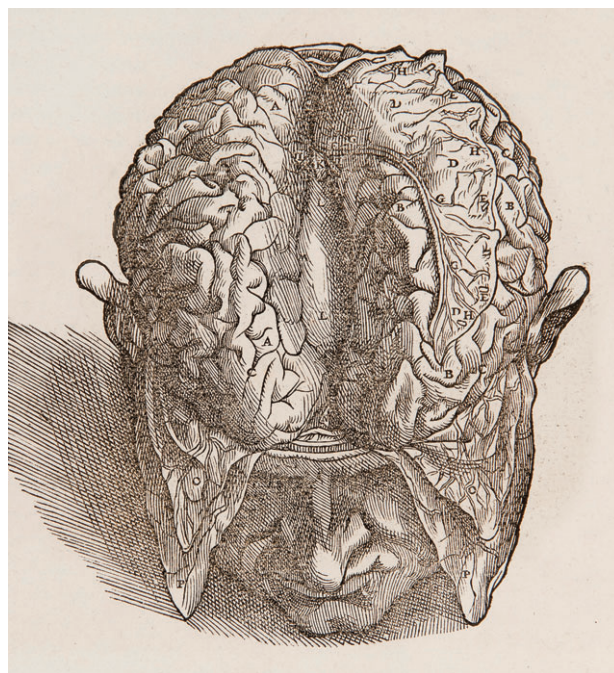


Fig. 10 Illustration of an anatomical dissection of the brain from the work of Andreas Vesalius (1543). The cerebral hemispheres are separated in the midline, and the sickle-shaped falx is removed from the longitudinal fissure and put aside on the left cerebral hemisphere

anatomy lesson (*Fig. 10*)^{1,4–6,11,13}. Vesalius considered the brain as the most important part of the body, the seat of the soul. From that perspective, a dissection of the brain itself would have been the appropriate culmination of Deijman's

anatomy lesson. However, we cannot ignore that Deijman drew our attention not to the brain itself, but rather to the shape of the exposed falx cerebri. The reason probably is a deeper meaning in Rembrandt's painting, connecting the sickle-shaped falx with the symbol of death. Death is usually represented as a skeleton holding a sickle, a tool used to cut the lifeline of mortals. In this regard, the sickle symbolizes human mortality. A skeleton, with a sickle in its hand, was also depicted in the medals of the Surgeons' Guild, a symbol that today has been perpetuated in the emblem of the Dutch Surgical Society. By showing the 'human sickle' in the form of the falx cerebri, Rembrandt and Deijman wanted to remind their contemporaries of the brevity of life. This memento mori motive is probably the hidden message inside Rembrandt's masterpiece¹¹.

References

- Ijpma FF, van Gulik TM. *Amsterdamse anatomische lessen ontleed*. Boom: Amsterdam, 2013.
- Ijpma FF, van Gulik TM. The anatomy lesson of Nicolaes Tulp, painted by Rembrandt in 1632. *Br J Surg* 2016; **103**: 1408.
- Ijpma FF, van de Graaf RC, Nicolai J-PA, Meek MF. The anatomy lesson of Dr. Nicolaes Tulp by Rembrandt (1632): a comparison of the painting with a dissected left forearm of a Dutch male cadaver. *J Hand Surg Am* 2006; **31**: 882–891.
- Middelkoop N, Noble P, Wadum J, Broos B. *Rembrandt Under the Scalpel. The Anatomy Lesson of Dr Nicolaes Tulp Dissected*. Six Art Promotion: Amsterdam, 1998.
- Middelkoop N. *De Anatomische les van Dr. Deijman*. Amsterdams Historisch Museum: Amsterdam, 1994.
- Middelkoop NE. Rembrandts anatomische les van Dr. Deijman. *Ned Tijdschr Geneesk* 1994; **138**: 2614–2618.
- Amsterdam Guild of Surgeons. *Anatomy Book of the Amsterdam Guild of Surgeons, Amsterdam City Archives, Archive of the 'Gilden en Brouwerscollege 366/294'*. Amsterdam Guild of Surgeons: Amsterdam, 1631–1731.
- Van Eeghen IH. Rembrandt en de mensenvilders. *Amstelodamum* 1969; **56**: 1–11.
- Lindeboom GA. *Dutch Medical Biography: Biographical Dictionary of Dutch Physicians and Surgeons 1475–1975*. Rodopi: Amsterdam, 1984.
- Van Eeghen IH. De anatomische lessen van Rembrandt. *Amstelodamum* 1948; **35**: 34–36.
- Ijpma FF, Middelkoop NE, van Gulik TM. Rembrandt's 'anatomy lesson of Dr Deijman' dissected. *Neurosurgery* 2013; **73**: 381–385.
- Bidloo G. *Ontleding des menschelijken lichaams. Uitgebeeld, naar het leven in honderd en vyf aftekeningen door de Heer Gerard De Lairesse*. De weduwe van Joannes van Someren, de erfgenamen Joannes van Dijk, Hendrik en de weduwe Dirk. Boom: Amsterdam, 1690.
- Vesalius A. *De Humani Corporis Fabrica Libri Septem*. Ioannem Oporinum: Basileae, 1543.