

PERSPECTIVE

THE ANATOMY LESSON OF DR. NICOLAES TULP PAINTED BY REMBRANDT IN 1632

From the beginning of the 16th century onwards, public anatomy demonstrations developed and spread across Europe. In 1555, King Philip II granted the Amsterdam Guild of Surgeons the privilege to dissect bodies of executed criminals to teach anatomy. Dissections were held once a year in the winter season as the corpses could be preserved at low temperatures. An anatomical theatre of the 17th century was usually designed to accommodate 200 to 300 persons. Physicians, surgeons, magistrates and other distinguished citizens were invited and paid admission to join the event.

Rembrandt's painting 'The Anatomy Lesson of Dr. Nicolaes Tulp' (1632) is considered a masterpiece and represents a group portrait of the Amsterdam Guild of Surgeons in the setting of an anatomy lesson (Fig. 1). Dr Nicolaes Tulp, physician and lecturer in anatomy (*Praelector Anatomiae*) in Amsterdam, demonstrated an anatomic dissection of a forearm using the corpse of an executed criminal. It was the body of Adriaen Adriaensz, also known as Aris Kindt, a man with a long criminal record. He was hanged for stealing a cape and using violence against his victim in January 1632. The anatomical accuracy, painting technique and interpretation of the painting have recently been discussed in this journal by Professor Mellick.¹ He states that the exchange of the lateral and medial epicondyle of the left humerus in the painting should be considered an anatomical 'error'. However, we do not agree with this conclusion on the basis of our own observations. We recently assessed the accuracy of the painting by comparing the depicted forearm with the dissected left forearm of a cadaver.^{2,3} Our comments provide a concise overview of the anatomical accuracy of the dissected arm in Rembrandt's painting. Professor Mellick discusses the adjustments that have been made to the painting during the painting process. He refers to

Schubach's analysis published in 1982.⁴ However, the restoration of the painting from 1996 to 1998 offered a unique opportunity to analyse the painting methods used and provided important new insights into Rembrandt's painting technique.⁵ The second part of our comments deals with these new insights. Finally, Professor Mellick raises the question that the painting truly is a lesson in functional anatomy. In the third part of our comments, we discuss some additional information about the symbolic interpretation of the painting, which should help to answer this question.

The presumed errors in the anatomy of the dissected forearm in Rembrandt's painting have been extensively discussed in medical and art history literature for decades.^{2,3} Professor Mellick stated that 'the origin of the forearm flexor group of muscles appears to be in the region of the lateral epicondyle of the humerus and this "mistake" has often been remarked upon.¹ The muscle held up in the forceps is the flexor digitorum sublimis with the flexor digitorum profundus beneath, and the proximal direction of the two muscles points directly to the revealed lateral epicondyle'.¹ Hence, Rembrandt's famous painting contains a well-known anatomic error in that the flexor muscles in Dr Tulp's forceps seem to originate from the lateral instead of the medial epicondyle of the humerus.^{2,3} We recently investigated the accuracy of the anatomy depicted in the painting by comparing the forearm in the painting with the dissected left forearm of a male cadaver.^{2,3} The left forearm in Rembrandt's painting is extended and supinated, with the wrist placed in the groin. The medial epicondyle of the humerus points towards the body. The lateral epicondyle of the humerus appears to be turned away from the body and is therefore not visible in the painting. Dr Tulp clearly shows the flexor muscles of the forearm that correctly originate from the medial epicondyle of the humerus, with its tendons coursing distally to the intersection of superficial and deep flexor tendons on the digits. The assumed anatomic error concerning the exchange of the lateral and medial epicondyle of the humerus should therefore be abandoned.^{2,3} Furthermore, dissection of the forearm of the cadaver revealed four anatomic differences compared with the anatomical structures in Rembrandt's painting (Fig. 2): (i) the sloping muscle that is prominently shown on the ulnar side of the proximal aspect of the forearm in the painting was not found at dissection; (ii) the flexor digitorum superficialis muscle lifted in Dr Tulp's forceps has a larger amount of muscle tissue; (iii) the muscle bellies of the flexor digitorum superficialis muscle in the forceps, giving rise to the tendons of the index/small fingers and the middle/ring fingers, have reversed positions in the painting compared with the anatomical dissection; and (iv) the longitudinal, cord-like white structure situated on the ulnar part of the small finger in the painting was not verified at dissection. Several anatomic variations and muscle transpositions have been proposed in the published reports to explain the discrepancies of the painting with the dissection.^{2,3,6}

The painting was restored from 1996 to 1998, offering a unique opportunity to analyse Rembrandt's painting technique.⁵ Professor Mellick stated that 'Thus, the 1632 painting itself was achieved by adding the seated surgeon to the left, removing the hat of the



Fig. 1. 'The Anatomy Lesson of Dr. Nicolaes Tulp' painted by Rembrandt in 1632 (canvas 169.5 × 216.5 cm), exhibited in the Royal Picture Gallery Mauritshuis in The Hague, The Netherlands. (Reproduced with permission from the Royal Picture Gallery Mauritshuis in The Hague, The Netherlands.)

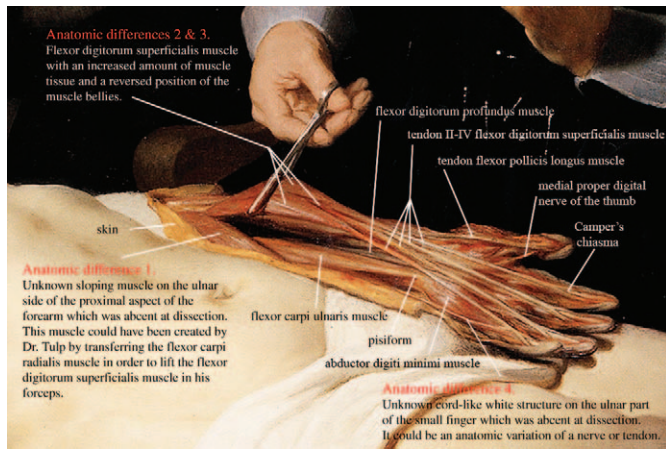


Fig. 2. Dissected forearm as depicted in Rembrandt's painting with identification of the anatomical structures and designation of the differences between the painting and a dissected forearm of a male cadaver. (Reproduced with permission from the *Dutch Journal of Medicine*, The Netherlands.)

surgeon at the apex of the group and by overpainting the anatomical figure on the original pamphlet with the names of the seven surgeons present'.¹ During its restoration, the painting was minutely examined using a stereomicroscope, ultraviolet light, infrared photography, reflectography and roentgen photography.⁵ Rembrandt was an artist whose compositions gradually took shape on the canvas, and during the painting process, he usually made several adjustments. All the depicted persons were part of Rembrandt's final composition. Frans van Loenen (seated most superiorly, at the apex of the group) was initially depicted wearing a black hat, which is clearly visible on the roentgen photograph of the painting (Fig. 3). In the final stage, Rembrandt decided to paint this over, probably because the physicians objected to a surgeon wearing a black hat, as this was considered the privilege of solely the physicians. He initially had painted an anatomic illustration of an arm on the paper held by one of the surgeon observers. The anatomic illustration was painted over to show a list of the names of the surgeon observers, probably at the time that the painting was restored for the first time in the 18th century (Fig. 4). The list of names has partly been removed recently, in order that Rembrandt's original anatomic illustration of an arm was made visible again.

There is no doubt about the authenticity of the anatomic appearance of the dissected left forearm; its appearance is original as depicted by Rembrandt in 1632. Roentgen photography of the painting, however, showed that Rembrandt had replaced the dissected left forearm from a higher to a lower position during the painting process (Fig. 3). It is also remarkable that the right forearm of the corpse was initially depicted by Rembrandt as an amputation stump (Fig. 5). According to juridical practice in the 17th century, amputation of extremities was sometimes carried out before execution, and the corpse was indeed that of an executed criminal as mentioned above. The reason why Rembrandt later changed this part and painted in the right hand remains unresolved. Maybe he pitied the criminal Aris Kindt or simply found it more aesthetic to depict an unmutated arm. The adjustments to the painting made by Rembrandt indicate that the painting went through a comprehensive process typical of the painter.

Professor Mellick put forward that the painting could truly be a lesson in functional anatomy because Tulp seems to support the

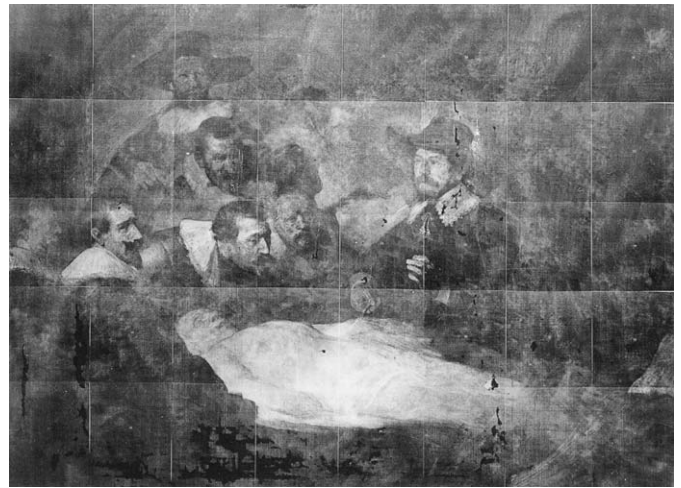


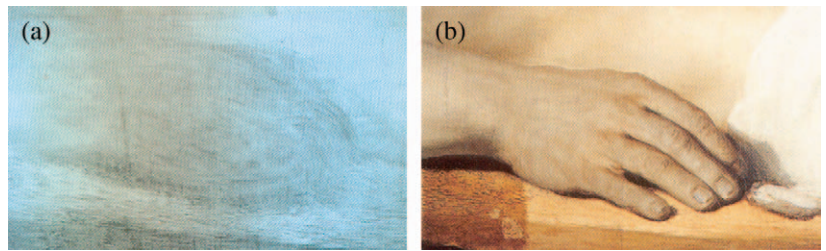
Fig. 3. Roentgen photograph of Rembrandt's painting. It clearly illustrates several changes made by Rembrandt during the painting process. The most superior seated surgeon was initially wearing a hat, the dissected left forearm was displaced from a higher to a lower position and the right arm of the corpse was initially painted as an amputation stump. (Reproduced with permission from the Royal Picture Gallery Mauritshuis in The Hague, The Netherlands.)

demonstration of flexor muscles with a gesture of his left hand.¹ The fingers of Tulp's left hand are flexed as if he wants to illustrate that pulling on the dissected flexor muscles with his forceps produces flexion of the fingers.¹ The anatomist Tulp was indeed one of the forerunners in his time teaching the relation between morphology and function. The question is, however, whether Rembrandt recorded an exact representation of the public anatomy lesson held on 31 January 1632. 'The Anatomy Lesson of Dr. Nicolaes Tulp' (1632) should be placed within a series of anatomy paintings of the Amsterdam Guild of Surgeons, which began in 1601 and extended far into the 18th century.⁵ None of the painting was intended to offer an exact representation of a public anatomy lesson.⁵ They all were group portraits, and their main purpose was to commemorate the tenure of a Praelector Anatomiae or membership of the Amsterdam Guild of Surgeons.⁵ Special occasions,



Fig. 4. Detailed picture of the piece of paper, held by one of the surgeons, showing the original anatomic illustration of an arm partially covered by a list of names of the surgeons in the painting.

Fig. 5. (a) Detailed roentgen photograph of the right arm of the corpse, which was initially painted by Rembrandt as an amputation stump. (b) In a later stage of the painting process, the amputation stump was reworked by Rembrandt to a meticulous painted hand.



such as the appointment of a Praelector or the opening of an anatomical theatre, were mostly the motives to create these paintings. Tulp's first public anatomic dissection in 1632 prompted him to have himself painted with a group of surgeons in the tradition of his predecessors.

Public anatomy lessons in the 17th century usually started with dissecting the perishable organs of the abdomen and thorax, whereas the extremities were the last to be dissected. In Rembrandt's painting, however, the forearm already has been dissected, whereas the rest of the body still is intact.^{2,3,5} This supports the notion that Rembrandt's painting is not a true representation of Dr Tulp's dissection but rather represents a symbolic interpretation of a classical anatomy lesson. Andreas Vesalius (1514–1564), the famous anatomist from Brussels, is believed to have influenced Tulp's choice of pose through the woodcut front piece of his book *De Humani Corporis Fabrica Libri Septem* showing a portrait of himself demonstrating the flexor muscles of the forearm (Fig. 6).^{2,3,5} Vesalius had accomplished a revolution in the knowledge of human anatomy by studying the functionality of anatomic structures in a practical way and refuting the theoretic

descriptions of the ancient anatomists. Vesalius considered the human hand a physical counterpart of the human psyche, an instrument for using further instruments and a representation of God's wisdom. Tulp was familiar with Vesalius's theories through his teacher in Leyden (Pieter Pauw), who himself had been a student of Vesalius. One century later, Dr Tulp might have chosen to be depicted with a dissected forearm to be considered the Vesalius' of his time and to confirm a new era in establishing the connection between practical anatomy and functionality. Moreover, public anatomy lessons were often preceded by a moralistic speech of the Praelector Anatomiae in which the audience was encouraged to acknowledge its own mortality and the divinity of creation.⁷ Thus, the painting depicts a group portrait in the form of an anatomy lesson but probably was not intended as an exact representation of Tulp's public anatomy dissection held on 31 January 1632.

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Fig. 6. Portrait of Andreas Vesalius, an illustration from his famous book *De Humani Corporis Fabrica Libri Septem*, Basel, 1543.

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