

# Anatomical renaissance: How important is the cadaver?

## REFLECTIONS

### AUTHOR

#### Rami Elias

St. George's, University of London

#### Address for Correspondence

Rami Elias

St George's, University of London

Cranmer Terrace

London

SW17 0RE

Email: m1706916@sgul.ac.uk

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*The Anatomy Lesson of Dr Nicolaes Tulp* is one of Rembrandt van Rijn's early works (1632) and is displayed in Mauritshuis Museum, The Hague, Netherlands. It depicts the official city anatomist of the Amsterdam Guild of Surgeons, Dr Nicolaes Tulp (right), dissecting the forearm musculature of the cadaver of Aris Kindt, previously a petty criminal. (1)



**Figure 1:** *The Anatomy Lesson by Dr Nicolaes Tulp*, oil on canvas by Rembrandt van Rijn. (2) Image courtesy of Mauritshuis, The Hague.

Rembrandt was famous for using light and shadow to emphasise protagonists; (3) the centrally placed cadaver is clearly the most well-lit subject of the scene. This prompted me to question the importance of the cadaver and its dissection to the study of human anatomy. Additionally, the assembly of surgeons around the cadaver – each with differing levels of attention to the prosected forearm – made me think of my own experiences in the dissecting room. This led me to reflect on the extent to which human anatomy education, and perceptions of it, have changed since the 17th century and whether the changes are positive.

Throughout history, cadaveric dissection has been an indispensable part of studying of human anatomy (the word anatomy originates from the Greek *anatomein*: to cut open), and consequently has become a prominent feature of medical education. The first recorded public dissection occurred in early 14th century Bologna; however, it was not until a century later that dissections became more common. One reason for this was the difficulty of acquiring cadavers. From this time until the 19th century, it became typical for cadavers to come from executed criminals. (4) Andreas Vesalius (1514–64), widely considered to be the greatest of early anatomists and father of modern human anatomy, was a prolific dissector who realised that the human body was not always as previously described; dissection allowed him to see for himself and be the first to accurately describe several anatomical structures, including the uterus. His book *De humani corporis fabrica* (open in the painting) was the first to be primarily based on evidence from cadaveric dissections. The desire of Vesalius to see the evidence behind the anatomy and not blindly trust preceding literature had become widespread by the time of Rembrandt, (4) so dissection was essential to anatomical studies.

In recent years, there has been a shift in how anatomy is taught; less emphasis is placed on dissection and prosection – some medical schools have no dissecting rooms at all, relying instead on non-cadaveric models and computer software for anatomy teaching. (5) However, it must be acknowledged that the accuracy and efficacy of these new methods of teaching would not be possible without cadaveric dissection in the first instance.

As a lay member of the public, my reaction to Rembrandt's painting would have been repulsion. Dissection has been widely regarded as debasing and morally repugnant through the ages. This has been reflected in cadaveric dissection being illegal for large parts of history. Consequently, the public image of medicine was damaged by body-snatching and murder to provide a supply of cadavers for dissection. (4) The implication of these serious crimes would be that the benefits to anatomical knowledge outweighed the risks to the professionals at the time. The fact that Aris Kindt had been executed for his crimes before becoming a cadaver suggests that in 17th century Christian societies, becoming a cadaver was an undesirable fate. The church did not approve of dissection; however, it

was more accepting if the cadavers came from criminals who were not involved with the church. (6) This view is still alive today in those who see their religious beliefs as incompatible with the practice of cadaveric dissection. (7) Furthermore, as medical students, we are taught of the four *prima facie* principles of medical ethics; one being non-maleficence or the duty of the doctor to 'do no harm' as stated by the Hippocratic oath. It is my opinion that this principle does apply after death, and therefore dissecting a cadaver could be considered contradictory to this. Despite its educational benefits, dissection could still be seen as mutilation, placing it in direct opposition with the public expectation of medical professionals (such as Dr Tulp) and the social contract between medicine and society. As such, the valid consent of the donor prior to their death is an absolute requirement. Unfortunately, regardless of his criminal status, Aris Kindt is unlikely to have been consented for dissection prior to his death.

Another reaction I would have had as a lay person is intrigue; the human body and study of its anatomy is deeply fascinating and relatable to everyone. This can be demonstrated as true both at the time of Rembrandt's painting and today. The Amsterdam Guild of Surgeons aimed its annual dissection or 'anatomy lessons' at trainee surgeons, with educational purposes in mind. However, these events became extremely popular in the Dutch Republic – prominent guests attended, and new theatres were built to accommodate large numbers of paying spectators. Additionally, artists such as Rembrandt were commissioned to paint these events. (6) In modern times, the anatomist Gunther von Hagens performed the first autopsy since the 19th century to 1.4 million people on live television in the UK. Whilst this kind of public dissection was illegal under the Anatomy Act 1984, it was performed in full without authoritative intervention. His travelling exhibition *Body Worlds* has received millions of visitors and recently became a permanent fixture in London. (8)

As a medical student, the painting also evoked positive emotions in me; it reminded me that anatomy is not merely theoretical, but a living and moving subject. In the painting, the wrist of Dr Tulp is flexed as he is demonstrating the action of the muscles in the dissected forearm. This led me to consider the relevance of cadaveric dissection in developing intricate knowledge of the human body for medical practice. Historically, anatomists have had backgrounds in surgery – examples include Fabricius ab Acquapendente as well as William Hunter and Henry Gray of St. George's Hospital, London. (4) It cannot be denied that accurate knowledge of anatomy is relevant when navigating structures during surgery in these disciplines. Furthermore, understanding structure is key in understanding function for physicians. But do we need cadavers to obtain this knowledge? In the painting, Rembrandt creates a vivid contrast between the pale grey skin of the cadaver and the healthy, flushed cheeks of the living. This highlights the fact that knowledge of *in vivo* anatomy necessary for practice is different from cadaveric anatomy. (5) However, I do not believe this should be an influential factor for medical schools to abolish cadaveric dissection altogether.

Sophisticated imaging techniques and hence minimally invasive procedures are increasingly becoming a larger part of medical practice. (1) Cadaveric dissection enables students to better understand three-dimensional anatomical structures and therefore develop the essential spatial reasoning skills needed to interpret the imaging data and target therapy to a specific site. (9) It therefore still holds importance in producing competent and up-to-date practitioners today.

Cadaveric dissection has been directly associated with anatomy learning for hundreds of years and remains so today. It has also been significant in directing public perceptions of the medical profession. (4) While the ethical implications of cadaveric dissection need to be considered, there is undeniable value in the use of education of medical professionals. Rembrandt's painting serves as a reminder of the historical significance of cadaveric dissection, allowing its viewers to reflect on its role in the modern day.

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