



Research Communication

HISTORY OF RACHANA SHARIR AND MODERN ANATOMY

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Abstract

This review focuses on how the study of anatomy in India has evolved through the centuries. Anatomical knowledge in ancient India was derived principally from animal sacrifice, chance observations of improperly buried human bodies, and examinations of patients made by doctors during treatment. The Susruta Samhita provided important surgical and anatomical information of the understanding of anatomy by Indians in the 6th century BCE. Here we review the anatomical knowledge known to this society. Modern Anatomy was first developed in Greece culture .They used dissection and vivisection to investigate the nature of the body. Earliest text were written by Hippocrates which were used to locate the body parts but were not clear to specify the perfect location of body parts, then Plato wrote advance Anatomy which described about the interconnection of various parts of the body in his work Timaeus. After that Plato's work was extended by Aristotle and he began first systematic dissection.. In Egypt Herophilus and Erasistratus applied Anatomical methods to medicine with dissection of human bodies. Anatomical practice continued to be refined throughout antiquity until it reached its pinnacle with Galen's monkey dissections and vivisection experiments.

Key words: Dissection, Sushruta Samhita, Anatomy, Vivisection, Medicine, Human bodies, patients.

INTRODUCTION

Healing traditions and medical practices are inextricably tied to human history. The oldest known civilizations have healing traditions associated with them and have added to our current knowledge of the medical sciences, particularly anatomy.

India is rich in such history and tradition, which includes significant contributions to our understanding of human morphology.

The Vedic philosophies form the basis of the Ayurvedic tradition, which is considered to be one of the oldest known systems of medicine and was compiled during the Vedic period. The *Susruta Samhita* was written by the famous physician and surgeon Susruta in the 6th century BCE who taught at the University of Benares (alternatively Kasi or Varanasi) on the Ganges River. He is best known for his tome of surgical wisdom, practices and tools. In Susruta's work, it is evident that considerable thought was given to anatomical structure and function, as Susruta was a proponent of human dissection his texts include a systematic method for the dissection of the human cadaver. Charaka lived in the mid 2nd century and was associated with the north-western part of India and the ancient university of Taksasila. Charaka Samhita contains 120 chapters arranged in five books. The Sarira-sthana discusses mainly anatomy, embryology and technique of dissection. The *Susruta Samhita* was written by the famous physician and surgeon Susruta in the 6th century BCE who taught at the University of Benares (alternatively Kasi or Varanasi) on the Ganges River. He is best known for his tome of surgical wisdom, practices and tools. In Susruta's work, it is evident that considerable thought was given to anatomical structure and function, as Susruta was a proponent of human dissection his texts include a systematic method for the dissection of the human cadaver. Charaka lived in the mid 2nd century and was associated with the north-western part of India and the ancient university of Taksasila. Charaka Samhita contains 120 chapters arranged in five books. The Sarira-sthana discusses mainly anatomy, embryology and technique of dissection. Interestingly, in neither the writings of Susruta or of Charaka is there any indication that animal dissection was practised. Their anatomical knowledge, therefore, appears to have been gleaned from human dissection. Moreover, their writings show a considerable familiarity with the bones of the human body. Susruta's *Samhita* emphasized surgical matters, including the use of specific instruments and types of operations. It is in his work that one finds significant anatomical considerations of the ancient Hindu. There is also compelling evidence suggesting that the knowledge of human anatomy was revealed by both inspection of the surface of the human body and through human dissection, as he believed that students aspiring to be surgeons should acquire a good knowledge of the structure of the human body. Interestingly, in neither the writings of Susruta or of Charaka is there any indication that animal dissection was practised. Their anatomical knowledge, therefore, appears to have been gleaned from human dissection. Moreover, their writings show a considerable familiarity with the bones of the human body . The advancement of surgery during ancient Indian medical history is significant when considering the obstacles that deterred the study of anatomy. According to Hindu tenets, the human body is sacred in death. Hindu law (Shastras) states that no body may be violated by the knife and that persons older than 2 years of age must be cremated in their original condition . Susruta was, however, able to bypass this decree and achieve his remarkable knowledge of human anatomy by using a brush-type broom, which scrapped off skin and flesh without the dissector having to actually touch the corpse. Susruta's description of anatomical specimens included over 300 bones, as well as types of joints, ligaments and muscles from various parts of the body. Critics suggest that

Susruta's overestimate of the number of bones contained in the human body may be due to the large number of child cadavers he observed (i.e. it is very possible that Susruta accounted for individual parts of bones that had not yet fused.) Despite his erroneous accounts of the skeleton, Susruta offered an in-depth understanding of bones, muscles, joints and vessels that far exceeded the knowledge of the time.

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It was Susruta's belief that for one to be a skilful and erudite surgeon, one must first be an anatomist. The *Sarirasthana* is made up of 10 chapters regarding the study of human anatomy.

Susruta –Samhita said: “The different parts or members of the body as mentioned before including the skin, cannot be correctly described by one who is not well versed in anatomy. Hence, any one desirous of acquiring a thorough knowledge of anatomy should prepare a dead body and carefully, observe, by dissecting it, and examine its different parts.

Dissection preparation

As previously discussed, the issue of using humans for dissection was in opposition to the religious law of the time; however, it was an essential tool for the true understanding of human anatomy. The following is the method that Susruta developed that enabled him to work within the confines of these laws.

Therefore for dissecting purposes, a cadaver should be selected which has all of whose parts of the body present, of a person who had not died due to poisoning, but not suffered from a chronic disease (before death), had not attained a 100 years of age and from which the fecal contents of the intestines have been removed. Such a cadaver, whose all parts are wrapped by any one of “munja” (bush or grass), bark, “kusa” and flax, etc. and kept inside a cage, should be put in a slowly flowing river and allowed to decompose in an unlighted area. After proper decomposition for seven nights, the cadaver should be removed (from the cage) and then dissected slowly by rubbing it with the brushes made out of any of usira (fragrant roots of plant), hair, bamboo or “balvaja” (coarse grass). In this way, as previously described, skin, etc. and all the internal and external parts with their subdivisions should be visually examined’.

Interestingly, the Susruta Samhita mentions the role of a student in the dissection: ‘A pupil, otherwise well-read, but uninitiated, in the practice (of medicine or surgery) is not competent to take in hand the medical and surgical treatment of disease.’ According to the Susruta Samhita, medical students should be taught the art of making cuts in the body of a puspaphala (a kind of gourd), alavu (bottle-gourd) or ervaruka (cucumber) prior to dissection of human cadavers.

HISTORY OF MODERN ANATOMY

The study of Anatomy begins at least as early as 1600BC, the date of the Edwin Smith Surgical papyrus, This treatise shows that the heart, its vessels, liver, spleen, kidneys, hypothalamus, uterus and bladder were recognized, and that the blood vessels were known to emanate from the heart. Other vessels are described, some carrying air, some mucus, and two to the right ear are said to carry the "breath of life", while two to the left ear the "breath of death"

GREEK ADVANCES IN ANATOMY

Nomenclature, methods and applications for the study of anatomy all date back to the Greeks. Herophilus was the first physician to dissect human bodies and is considered to be the founder of Anatomy. He reversed the longstanding notion made by Aristotle that the heart was the "seat of intelligence". He argued instead that this seat was the brain. He established the brain as the center of intelligence, distinguished between veins and arteries, and made many other accurate observations about the structure of the human body, especially the nervous system.

FROM ANCIENT TO MEDIEVAL

The final major anatomist of ancient times was Galen, active in the 2nd century. He compiled much of the knowledge obtained by previous writers, and furthered the inquiry into the function of organs by performing vivisection on animals.

EARLY MODERN ANATOMY

From the 3rd century BCE until the 12th century, human anatomy was mainly learned through books and animal dissection.

For many decades human dissection was thought unnecessary when all the knowledge about a human body could be read about from early authors such as Galen. In the 12th century, as universities were being established in Italy, Emperor Frederick II made it mandatory for students of medicine to take courses on human anatomy and surgery. Students who had the opportunity to watch Vesalius in dissection at times had the opportunity to interact with the animal corpse

Anatomist Mondino de Luzzi

Mondino de Luzzi "Mundinus" was born around 1276 and died in 1326; from 1314 to 1324 he presented many lectures on human anatomy at Bologna university. Mondino de'Luzzi put together a book called "Anathomia" in 1316 that consisted of detailed dissections that he had performed, this book was used as a text book in universities for 250 years.

Leonardo da Vinci

Leonardo da Vinci (1452–1519) was trained in anatomy by Andrea del Verrocchio. In 1489 Leonardo began a series of anatomical drawings depicting the ideal human form. This work was carried out intermittently for over 2 decades. During this time he made use of his anatomical knowledge in his artwork, making many sketches of skeletal structures, muscles and organs of humans and other vertebrates that he dissected.

17th and 18th centuries The study of anatomy flourished in the 17th and 18th centuries. At the beginning of the 17th century, the use of dissecting human cadavers influenced anatomy, leading to a spike in the study of anatomy.

Anatomy Act 1832

The British Parliament passed the Anatomy Act 1832, which finally provided for an adequate and legitimate supply of corpses by allowing legal dissection of executed murderers. The view of anatomist at the time, however, became similar to that of an executioner. Having one's body dissected was seen as a punishment worse than death,

Anatomical theatres

Anatomical theatres became a popular form for anatomical teaching in the early 16th century. The University of Padua was the first and most widely known theatre, founded in 1594. As a result, Italy became the center for human dissection. People came from all over to watch as professors taught lectures on the human physiology and anatomy, as anyone was welcome to witness the spectacle. Participants "were fascinated by corporeal display, by the body undergoing dissection".

19th century anatomy

During the 19th century, anatomical research was extended with histology and developmental biology of both humans and animals. Women, who were not allowed to attend medical school, could attend the anatomy theatres. From 1822 the Royal College of Surgeons forced unregulated schools to close. Medical museums provided examples in comparative anatomy, and were often used in teaching.

Anatomical research in the past hundred years has taken advantage of technological developments and growing understanding of sciences such as evolutionary and molecular biology to create a thorough understanding of the body's organs and structures. Disciplines such as endocrinology have explained the purpose of glands that anatomists previously could not explain; medical devices such as MRI machines and scanners have enabled researchers to study organs, living or dead, in unprecedented detail.

MATERIAL AND METHODS

Bruhatrayees along with their commentaries by different Authors were referred for the study. References from modern texts of Anatomy were also utilized. While studying the History of Rachana sharer and modern Anatomy Sushruta Samhita was specifically referred and the commentaries of different autors on Sushruta Samhita were refered. Te matter available on internet and published journals were also studied.

DISCUSSION

The text written by our Ancient Acharyas and also other authors of modern text had to face many challenges and obstacles to serve us with the detail knowledge of Anatomy. In ancient Era death was a sacred to them and any invasion or procedures to be done on cadaver was strictly prohibited by the society and law and their were stringent laws. But for the sake of society i.e to heal patients with medicine and to perform surgeries a thorough knowledge of body parts their surface markings and connection with each other was necessary and Sushruta believed that theoroticle knowledge is in vain unless students are not aware of its practicle implementation and hence Sushruta insisted on Dissection and invented apricedure of preservation of cadaver for practice of dissection. In modern Anatomy also Galen, Aristotle, Hippocrates everyone has to face chaallenges to serve students with thorough knowledge of Anatomy. All other countries has to practice Dissection on Animal but only India was the country where we Started dissection directly on Human Cadaver Which is indeed a great Achievement in the Era where then was no access to Equipements and when there was stringent laws against dissection. Now Anatomy has advanced to such an extent that not only body parts and their interconnection are studied but every cell and tissue of the body can be studied in details and it's due to the sweat shed by our ancient Anatomist.