

THE CHANGING FACE OF HUMAN ANATOMY PRACTICE: LEARNING FROM HISTORY AND BENEFITING FROM TECHNOLOGY



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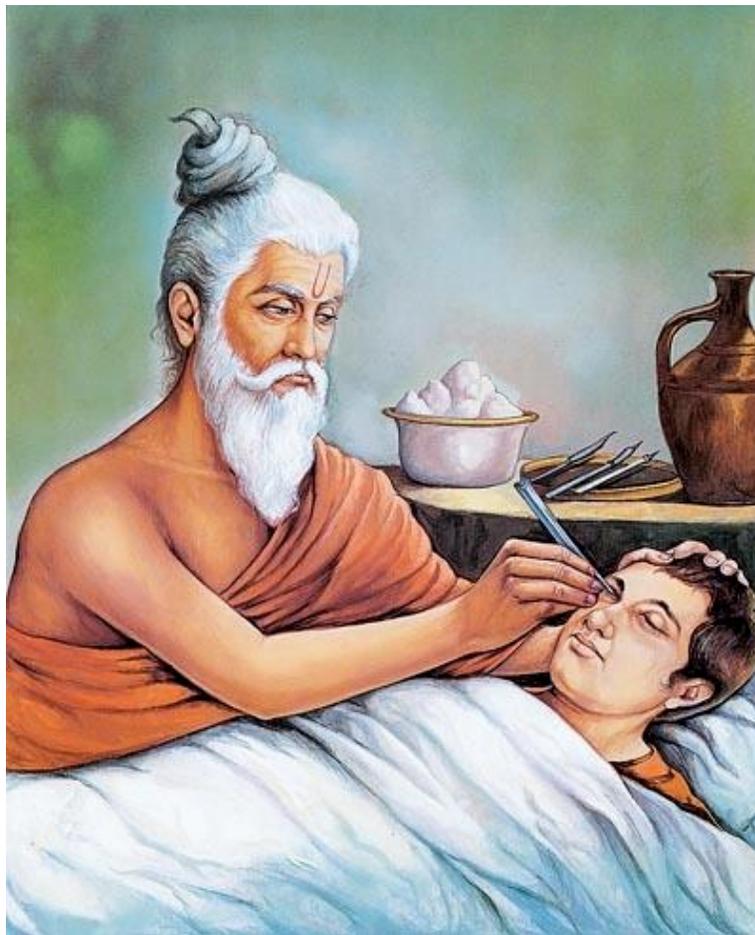
Contemporary practice of Human Anatomy should combine historical practices and current advances in technology. The history of Anatomy has changed dramatically over the years. It was not until the Grecian Period that people began to accept anatomy as a science. Originally nobody knew anything about anatomy and its relationship with disease. It was believed, for example, that if you had a disease it was because god was punishing you. The Grecian period produced, among others, the famous Greek physician, Hippocrates (Swain, 2012). The face of Human Anatomy has been transformed by changes in cultural and religious beliefs, and legislative frame-works. There have also been increasing additional objective findings and advancements in technology. These factors have contributed to evolution of knowledge, methods of study, sources of bodies and approaches to Human Anatomy teaching and research. This editorial covers historical highlights of some legends, methods of study, sources of bodies, current practices and future prospects in Human Anatomy.

The account of History of Anatomy by Siddiquey et al (2009) chronicles the most luminary of legends including Hippocrates (460 - 377 BCE) who taught anatomy in Greece and is regarded as father of medicine. He stated, "The nature of the body is the beginning of medical science". Aristotle (384-322 BCE) was the first person to use the term "anatomē" a Greek word meaning "cutting up or taking apart". The Latin word *dissecare* has similar meaning. The most influential anatomist in ancient world was Galen (about 130 - 200AD), a physician and prolific writer who studied anatomy at Alexandria and later worked at Rome. Andreas Vesalius's (1514-1564 AD) masterpiece *De Human Corporis Fabrica*, published in 1543, marked a new era in the history of Medicine. Vesalius recognized anatomy as the firm foundation of medicine. The Arabian physician Ibn Zuhr (Avenzoar) (1091-1161) was the first physician known to have carried out human dissection and post mortem autopsy. In the 12th century, Saladin's physician Ibn Jumay was also one of the first to undertake human dissection and he made an explicit appeal for other physician to do so as

well. Leonardo da Vinci (1489) dissected about thirty human corpses, many of them at a mortuary in Rome and produced a series of anatomical drawings amounting to some 750, including studies of bone structures, muscles, internal organs, the brain and even the position of the foetus in the uterus.

Most accounts of History of Anatomy often fail to recognize the heroes of ancient India. One such was Rishi Sushruta [about 600BC], a man whose work preceded that of the European stallwarts – Hippocrates, Galen and Celsius He

is one of the earliest surgeons of recorded history (Saraf and Parihar, 2006; Bhattacharya, 2009). This man was one of the earliest to advocate for, and practice the study of the human body, by dissection from the surface to superficial and internal structures (Loukas et al., 2010). Sushruta's accounts are contained in his compendium, the "Sushruta Samhita". In this issue, of Anatomy Journal of Africa Deepa and Pushpalatha (2014) highlight the vast contribution of Sushruta to Anatomy and emphasize how thorough knowledge of Anatomy must have helped him in becoming the father of Indian surgery.



Rishi Sushruta at work about 600BC

To encourage scholars to document the role individuals play in promoting Human Anatomy, we have also carried the article, which pays tribute to Johannes Toerien for the role he played in entrenching Human Anatomy at the

University of the Free State, in South Africa (Correia and Wessels, 2014).

Several methods of studying the human body are recorded in history and contemporary

practice. (McLachlan and Pattern 2006). Herophilus and Erasistratus, (3rd century BC) made the first scientific studies designed to discover the workings of human anatomy by vivisection, that is, "dissection" of live bodies. They vivisected convicted criminals. Proponents of vivisection - justified the suffering of the criminals as providing 'remedies for innocent people of all future ages' (Atalic, 2012). Another method of study, practiced by Sushruta of Ancient India, was "dissection without cutting", since Hindu tradition and religious beliefs prohibited cutting of bodies. This is therefore how they prepared their "cadavers". Having removed all the fecal matter from the body, the body was wrapped in grass, placed in a cage and firmly secured in a hidden spot in a river, with slowly flowing water. After 7 nights, the thoroughly decomposed body was taken out and very slowly scrubbed with a whisk, made of grass roots (of Kusa) to peel off the layers of the skin and study the interior. Every part of the body, beginning with the skin was then examined systematically [Rajgopal et al., 2002].

The method we are most conversant with is cadaver dissection, which has remained core to anatomy teaching in most parts of the world since Renaissance. Dissection in the early days, in Italy, was done in the anatomy theatre open for the public to view. Laboratory dissection, restricted to designated practitioners and students came later. In Italy, women were not permitted to take part in anatomy classes. Subsequently, dissection became encultured into medical education such that it has become an almost universal expectation of medical courses. Recently, however, there has been worldwide debate on whether or not to teach anatomy by cadaver dissection (McLachlan and Patten, 2006). The position taken by the so-called conservatists has been to retain cadaver dissection and supplement it with any other, so called newer methods of instruction (Ogeng'o, 2009; Ogeng'o et al., 2012). A reassuring aspect of teaching of Anatomy in Africa is the positive attitude displayed by students in new medical schools (Karau et al., 2014).

The most recent, but often neglected approach is the so-called living anatomy, that is teaching anatomy through the study of the living body. Two publications – "Anatomy in the living model" (Waterson, 1931) and "Living Anatomy" (Lockhart, 1947) emphasize the value of this method of Anatomy instruction. Indeed Lockhart advised: "Keeping your eye on the body, especially the living body is the first principle of anatomy". Barrows et al (1968) recommended the use of the life models in anatomy teaching, commenting that "during the anatomy course, the students gradually develop an objective but respectful attitude towards the cadaver. Studies have concluded that 'live models are superior to using cadavers, especially in demonstrating superficial anatomy landmarks' (Barrow et al., 1968; Stillman et al., 1978)".

The demand for bodies has always outpaced the legally available supply, especially in countries with lack of regulations, among them the United States in the 19th century. The result was the development of an illegal trade in bodies obtained by "bodysnatching," the theft of bodies of the recently deceased from graveyards (Olry, 1999) and the use of bodies of disenfranchised members of society, such as criminals, the executed, the poor, the black, and the immigrants. Body procurement lay either in the hands of anatomy staff and medical students, or professional "body-snatchers" (Hildebrandt, 2010).

The legal ways of securing bodies include obtaining unclaimed bodies and those of body donation programs. Two driving forces for establishment of body donation programs: are the decreased availability of unclaimed bodies and the change in public opinion concerning modern medicine. The combination of improvement in general health of the population as well as better burial benefits led to a decrease of unclaimed bodies from public institutions by the middle of the 20th century (Garment et al., 2007; Warner, 2009). While sporadic body donations had been known to occur in Europe and the United States in the 18th and 19th century, these were usually

individual donations from anatomists, doctors and prominent individuals.

Teaching of Human Anatomy and Anatomical research has recently taken advantage of technological advancement. Ultrasound, computerized tomography, magnetic resonance imaging, positron emission tomography and angiography allow the study of organs in living and dead individuals. Progress in anatomy today is centered on the development, evolution, and function of anatomical features. The subfield of non-human anatomy is particularly active as the "modern" anatomist seeks to understand basic organizing principles of anatomy through the use of advanced techniques encompassing light and electron microscopy, histochemistry, finite element

analysis, nanotechnology and molecular biology (Siddiquey et al., 2009). A remarkable feature of this issue of the journal is the experimental nature of Anatomical studies (Akinola et al., 2014; Balogun et al., 2014). This character brings life to Anatomy, and has the potential to enhance research in Anatomy.

This special issue of the Anatomy Journal of Africa carries a combination of informative articles covering rich historical gleanings, interesting descriptive accounts, experimental studies in human beings and animal models, and attitudes towards dissection, all contextualized to enrich the progress of Anatomy.

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