

Pedagogical value of dissection anatomy in Kenya

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ABSTRACT Anatomy has historically been a cornerstone in medical education regardless of nation or specialty. Revolution in the training of anatomy has been based on the lack of adequate instructors, cadavers and the general high cost of anatomy training. This has led to the abandonment of dissection by most countries in favour of other methods of learning. At the University of Nairobi, the need for more instructors has been addressed by training anatomists and by incorporating surgical resident students in the training of undergraduate medical students. The catchment of collecting cadavers has been increased to address the need for cadavers, with increased competition for this resource from other medical schools in Kenya. This article shares our experience at the Department of Human Anatomy, University of Nairobi, and presents arguments for the dissection course as a central tool for teaching macroscopic anatomy.

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Anatomy is the basis of medicine and biomedical sciences.⁽¹⁾ It defines medical language and is core in the training of surgery, radiology and oncology.⁽²⁻⁴⁾ The teaching of anatomy has been under much scrutiny in many countries, with current medical curricula reducing the hours dedicated toward anatomy education, especially in the USA and Europe.^(1,5-7) The question of how best to teach anatomy is still largely unanswered, with the traditional cadaver and the role of dissection in teaching anatomy receiving much critique, resulting in the teaching of anatomy being altogether abandoned in some institutions.⁽⁸⁻¹⁰⁾ This is complicated in many African settings by limited modern resources and a high demand for trained medical practitioners. While the cadaver is the best study material for the construction of a three-dimensional image of the human anatomy, it has been condemned as costly, hazardous and pungent.^(3,11,12) The benefits of orthodox dissection include memory enhancement, reciprocal peer teaching, three-dimensional anatomy and spatial association.^(2,13-15)

Clinical reasoning, physical examination skills, clinical imaging, diagnostics, the use of problem-based learning and the application of teaching modalities, such as the use of prosected specimens, models, radiographic images and computer simulations, have been introduced into medical school curricula as a result of advances in science and medical diagnostics, which have led to a reduction in the time committed to teaching anatomy and dissection.^(16,17) There is consensus that the teaching of anatomy to undergraduate medical students should be rationalised, horizontally and vertically integrated with other medical subjects, and taught using a variety of techniques, with dissection as the main tool.^(18,19) Among many African countries, dissection has been shown to enhance students' understanding of anatomy and has enabled them to pass examinations.^(20,21) As there are few accounts of teaching anatomy in Africa, arguments for dissection as a central method of teaching anatomy are raised in the Kenyan case.

The University of Nairobi (UON) Medical School is the largest and oldest medical school in Kenya, currently producing

80% of all graduate medical doctors in Kenya. Its Department of Human Anatomy was started in 1967 and has four main units: topographic anatomy; microscopic anatomy; embryology; and morgue. To date, the department has trained about 5,000 medical students. Since 2009, a student-centred teaching approach employing multiple techniques, including dissection, laboratory demonstration, small group teaching and few didactic lectures, has been adopted. Currently, there are 320 medical students in a five-year medical training programme; each student painstakingly commits six hours a week for 40 weeks a year to dissection, amounting to a total of 240 hours of laboratory experience, in their first year of medical training. Half of this time is spent on dissection on their own, while the remaining half is spent on exploring the dissected structures with anatomy demonstrators and the faculty. Most (90%) of the students acknowledge that dissection is the most appropriate method of training, even though only 30% of the students intend to be surgeons after their basic medical training. 16 postgraduate surgical residents and 20 anatomy graduates (BSc) demonstrate the anatomy during the dissection sessions. In the same week, the students interact for two hours with the faculty in small group tutorials and integrated didactic lectures. There is a three-hour practical session on Histology and a two-hour lecture on Embryology every week.

Each year, medical students use 80 cadavers, one cadaver per dissection table, giving a student-cadaver ratio of 5:1. Cadaver acquisition is a rigorous exercise involving the collection of unclaimed bodies from hospital mortuaries throughout the country, in line with Kenyan laws. None of the cadavers is donated. The departmental faculty comprises four professors, nine lecturers and three tutorial fellows, with a staff to student ratio of 1:20. In addition to undergraduate medical students, the Department of Anatomy is involved in teaching Gross Anatomy, Embryology and Histology to residents in Surgery, Gynaecology/Obstetrics, Ear, Nose and Throat, as well as Anatomy students (including Bachelor, Masters and Doctorate students)

Table I. Profile of staff in African medical schools.⁽²²⁾

Country	Staff-student ratio	Medically qualified staff (%)	Academic qualifications of staff (%)				Medically qualified staff with PhD (%)
			PhD	Masters	Honours	Bachelor	
Nigeria	1:15–35	44–60	10–67	50–90	0–11	0–16	0–100
Kenya	1:20	100	25	56	0	19	100
Egypt	1:15–35	100	42–75	23–37	0	21	50
RSA	1:25–35	10–75	13–100	3–75	0–25	0	0–100
Zambia	1:30	1,100	50	50			50

and students in the schools of Dentistry, Nursing and Pharmacy. However, the large student numbers often hinder personalised interaction with the faculty. There are three other medical schools in Kenya; one school utilising a problem-based learning approach, while the other two teach anatomy by dissection.

Curriculum review in our setting has currently settled for multiple teaching approaches centred on dissection.⁽¹⁹⁾ This integrated model of teaching is used in some medical schools in Uganda, Nigeria and South Africa.⁽²²⁾ While anatomy is taught in different years of medical training in many African medical schools, a large number of students would benefit from this integrated approach, as dissections also expose students to the use of surgical equipment early in their training.⁽²³⁾ These skills become more useful later in their training and career in surgery. Hands-on skill can never be achieved by any other method of teaching anatomy. In addition, during dissection, medical students can relate the details of the structures they encounter in three dimension.⁽²⁾ Dissection also concretises the knowledge of anatomy learnt through lectures, tutorials and even the Internet.⁽¹⁵⁾

One of the challenges of dissection is the lack of trainers.^(24,25) This problem has been recently contained at our department with the hiring of more trainers, as well as efforts made to train and retain anatomy teachers. In general, the staff to student ratio in many African medical schools ranges from 1:15 to 1:30 (Table I).⁽²²⁾ This ratio is worsened if one considers dental, pharmacy, nursing and surgery students who are trained in anatomy by the same trainers.⁽²⁴⁾ In our case, it is therefore imperative to train a new generation of Bachelor, Masters and Doctor of Philosophy anatomists to meet this need.⁽²⁴⁻²⁶⁾ The overall aim of these programmes is to provide trainees with the necessary knowledge, understanding, aptitudes and attitudes in appropriate detail, as well as to enable them to teach and examine anatomy with full competence at the undergraduate and postgraduate levels.⁽²⁵⁾ Surgical residents have also been used in other settings to demonstrate to undergraduate medical students.⁽²⁷⁾

The other challenge of dissection is the lack of cadavers.⁽²⁴⁾ Donation of bodies to anatomical laboratories has reduced significantly reduced over the years and is altogether nonexistent in our setting.⁽²⁸⁾ Culture and religious beliefs constantly prohibit the wilful donation of bodies for anatomical dissection.^(24,29,30) Moreover, anatomists themselves are hesitant to donate their own bodies for dissection.⁽³¹⁾ Neglected and abandoned bodies,

which would otherwise be buried or destroyed, account for over 90% of dissected cadavers in Kenya and other African countries.⁽¹⁴⁾ The catchment areas for these bodies have been increased because of the insufficiency created by the increasing number of medical students in Kenyan schools, which are competing for the same resource. In contrast, donated cadavers make up 80% of the total cadavers in North American medical schools, while all the cadavers used for dissection in the United Kingdom are donated. The ethical rationale of using unclaimed bodies to teach anatomy has been questioned.⁽³²⁾ Demystifying medical training and educating the society on the need to donate bodies for training doctors may increase the number of donated bodies in Africa.⁽³⁰⁾ Donation of surgically removed body parts for therapeutic purposes (usually destined for destruction) to anatomical laboratories to be used in training could ease the routine need for embalmed whole cadavers.⁽⁷⁾

While there are merits to revolutionising the teaching of anatomy, the use of new technology should complement dissection, not replace it.⁽¹⁸⁾ Dissection is greatly beneficial in the training of a physician or surgeon and cannot be done away with.⁽¹⁹⁾ As each medical school is challenged to set its unique objectives on how to deliver the anatomy content to its students, the teaching methodology should still rely on dissection, with imaging, simulation and the Internet used only to further consolidate and enhance the learning experience.

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