# A Surgeon's View: The Decline and Perhaps the Fall of Gross Anatomy Instruction

**Darvan A. Moosman, MD,** Ann Arbor, Michigan

In recent years there has been a progressive deemphasis and decline in gross anatomy instruction almost to a point of extinction in many medical schools. This lack reflects a contemporary trend and philosophy promulgated by restless administrators that everything old is obsolete and must be discarded, whereas all things new, novel or innovative should be adopted regardless of the long-term consequences or benefits to our medical students. For the sake of student motivation by early patient contact, some innovators advocate that the presentation of anatomy be delayed until late in the year; therefore, first semester medical students appear on the hospital ward armed only with enthusiasm, a white coat and a shiny new stethoscope, but without significant anatomic knowledge of the region they are attempting to examine or understand. Similarly, upper class students seem unaware of the risks of injury to significant adjacent structures in their consideration of paracentesis, nerve blocks, arterial and venous blood sampling, central vein catheterization and invasive diagnostic procedures. Indeed, it is also evident in the operating room when the surgeon questions the student or house officer assistants about the anatomic structures pertaining to the operative procedure.

This deficiency in practical anatomic knowledge has not been alleviated by the continued reduction in course hours allocated to anatomy in contemporary medical school curricula. In some instances gross anatomy has been attenuated and abbreviated to almost a survey course without human cadaver reference and has been assigned to some dark out-of-the-way corner of the medical curriculum. Some curriculum planners with unrealistic correlation expectations have it scattered in bits and pieces throughout several semesters, whereas others propose that gross anatomy should be an elective course or one with various depths of coverage to be given only to those who might plan some type of surgical specialty training some 3 or 4 years later. Yet we need only consult senior medical students or house officers to ascertain how very few actually knew their future interests at the time this decision had to be made. Both the study and practice of medicine deals with the human body and all of its parts; therefore the beginning student is not in a position to determine the ultimate use of this essential information. Basic anatomic information is additionally made imperative by the reduction of prerequisite premedical biologic science course requirements that has become vogue in recent years. I believe that it is important to establish the premise that anatomy is useful, applicable and essential for our medical students and that a certain amount of information cannot be deleted or condensed beyond a certain degree, regardless of other course demands on curricular time. In addition, a greater effort must be made during gross anatomy instruction to stress its functional and clinical application.

Before we clinicians can attempt to reverse this unfortunate decline of anatomy, it would be well to review briefly some of the distractive events that over the years have brought about this deemphasis in order to find some practical solutions. Some signifi-

From the Section of Clinical Anatomy, Department of Anatomy, The University of Michigan Medical Center, Ann Arbor, Michigan.

Reprint requests should be addressed to Darvan A. Moosman, MD, 4815 Medical Science II, University of Michigan Medical Center, Ann Arbor, Michigan 48109.

cant and detractive factors have been as follows: the reaction to many past decades of basic science overemphasis with the presentation of too much nonessential and noncorrelative detail; the marked reduction in hours allotted for gross anatomy instruction; the imprudent manipulation of the curriculum to obtain confusing and unrealistic correlation objectives; the preoccupation with cash-generated research that detracts from teaching efforts; and the surrender and eventual loss of control by physicians and surgeons of basic science course content and instruction.

## Ascendancy of the Basic Sciences

In the years after the 1910 Flexner report [*1*] on medical education, both basic and clinical sciences were improved and upgraded. Subsequently, basic sciences began to reign supreme during the 1st and often the 2nd year of the medical school curriculum. Failure in any one of the basic science courses frequently terminated a promising career in medicine. Indeed, before World War II the required medical school courses in anatomy, physiology, biochemistry and microbiology (then known as bacteriology) all too frequently could be categorized as basic science overkill by requiring the exhaustive memorization of minutia and excessive detail that had little if any practical or future clinical relevance.

Gross anatomy since ancient times has traditionally been considered the basis and language of medicine and surgery. However, for many decades it had created problems for itself by overwhelming the student with unnecessary and noncorrelative detail. During that time one or more semesters were devoted to learning, with rigid encyclopedic detail, the precise origins and insertion of muscles; the identification of dry disarticulated bones including right and left orientation as well as almost every ridge and protuberance; the memorization of long lists of insignificant branches of blood vessels and nerves; and the detail of obscure fascia. In this strenuous and painful endeavor, function and clinical correlation was completely overlooked or lost in this maze of detail. Thus, bones and joints were not correlated with radiographs or with dislocations and fractures, muscles and their innervation were not taught as functional groups, nerve lesions producing specific loss of function were not considered and blood vessels were rarely related with venograms and arteriograms. Therefore, it is understandable that this method of anatomy instruction became the target for discontent during the subsequent winds of change. Unfortunately, however, the pendulum has now swung from these excesses to alarming deficiencies.

## Curriculum Changes

After World War II a great amount of new information and courses were added to the medical school curriculum, and for this reason it became necessary to obtain time from existing courses. Anatomy, which traditionally had the largest block of hours, was chosen as a readily available source for this time. This was both proper and logical provided the reduction of material was highly selective and did not destroy the course in the process of pruning. Unfortunately at that time, clinicians, especially surgeons, were not consulted and they did not persevere in their efforts to decide precisely what material should be retained or omitted. All too often these judgments about course content were unfortunately retained in the covetous hands of the nonphysician faculty who had neither insight nor significant interest in medicine and therefore were not in a logical position to make such important value judgments. As a result, even with this shortened curricular time allocation, irrelevant detail was retained, whereas practical and clinically useful information was deleted. Clearly such decisions about course content should have been made by those with clinical experience and training and thus the necessary insight into the ultimate use of this information by our future physicians.

The clinical correlation of preclinical basic science courses is important and necessary. However, in many instances these clinical correlative attempts were carried out in such an unorganized and erratic manner that they became less than helpful to the student because of the deletion or dilution of essential preclinical information. Correlation cannot be accomplished by merely intermixing courses in sequential time periods or by busing the faculty from one course to another for clinical spot commercials. Unless the content of the correlative courses is carefully controlled and evaluated, it produces a melange of poorly comprehended information that other courses, in theory, were expected to provide. Unfortunately, in all this overly optimistic correlative preoccupation, it was perhaps forgotten that the student requires a sufficient foundation of learned and digested basic information to allow clinical and functional correlation. There persists a common fallacy that all new situations can be solved by reorganization, which creates the immediate illusion of progress but in fact only results in confusion and inefficiency.

## Cash-Generated Research Versus Teaching

Significant factors in the rapid decline in the quality and interest in teaching were the changes created by the increasing commitment to research.

In the 1950s an era of almost unlimited research grants and government subsidies began. These abundant, free and easily obtained dollars had major and continuing impact on our educational institutions. Almost any and all research projects, productive or otherwise, could be expected to produce continuous cash transfusions into institution and department budgets. Cash-hungry administrators did not overlook or resist this new bonanza of almost limitless dollars that could provide previously unobtainable expensive equipment, the brick and mortar of new buildings, fully subsidized additional research-oriented faculty and scores of technicians and assistants. Thus research soon bloomed and flourished under the sunshine and warm showers of these easily obtained dollars. However, it soon became obvious even to the casual observer that engaging in almost any type of research was a sure and rapid rise in recognition, promotion and predictable salary increases. The long hours of preparation and standing on one's feet teaching were soon regarded as something to be diligently avoided and were relegated to the few dedicated and conscientious teachers on the faculty who were often stigmatized as being nonproductive, nonessential and perhaps not too intelligent by fellow faculty and administrators. Thus began a progressive conversion from teaching to research for the purpose of obtaining funds, and soon the tail began to wag the dog.

Indeed, to better attract these research dollars, it became fashionable in anatomy to select research-oriented histochemists and experimental molecular and cell biologists (almost always nonphysicians) as anatomy department chairmen. They, in turn, aggressively selected and promoted faculty likewise committed to their own interests. As a result, many anatomy departments evolved into almost autonomous histochemistry, ultrastructure, cell or experimental biology enclaves whose major interest and commitment was research, with less and less concern for providing essential student instruction. Unfortunately, these noninstructional activities often seem to have been made to establish prestige with little demonstrable utility. It should be remembered, contrary to prevailing theory, that all research efforts do not necessarily produce information useful to students. The proper balance of teaching and research is difficult to evaluate and attain, yet it is essential that all medical school departments provide basic, pertinent and fundamental information during their allotment of curricular time.

## Recommendations

The time has come for us to halt this unfavorable decline and deemphasis on practical and essential anatomy instruction to prevent its virtual elimination from the medical curriculum to the ultimate detriment of our profession. Although there may be no single solution, several positive and easily obtainable corrective measures are available if we insist and persevere.

First, it is imperative that clinicians again resume and assert their traditional leadership and responsible control of medical curriculum and education. This is particularly necessary in the preclinical basic sciences where both course and content should become more correlative, practical and relevant to the clinical courses. An effective means of obtaining this goal is to select more medically trained faculty, administrators and especially chairmen who have a better understanding of clinical medicine and surgery and a more balanced view of both teaching and research. Unless we clinicians are willing to assume this positive leadership, our authority and control of the medical curriculum will be preempted by the paramedical faculty, who may have less than an altruistic interest and commitment in providing fundamental and practical instruction to our future physicians.

The study of gross anatomic structure must be restored to a respectable and emphasized place in the curriculum. It should be given as a continuous course, oriented and presented in a functional and correlative manner, not in the former classic systemic encyclopedic method of minute detail. All medical students should have the same fundamental course of useful and practical anatomic information regardless of future specialty. The most advantageous time to schedule gross anatomy is during the first semester of the medical curriculum, and it should be assigned no less than 200 hours. It is most effectively presented and learned by both lecture and student dissection. Whole class lectures given by experienced and skilled faculty remain the most productive and efficient method of transmitting the maximal amount of specific information. This method requires preparation, organization, skill and clarity of presentation, which are not necessarily attributes or inherited traits conferred on faculty by position, seniority or promotion. Perhaps for these very reasons class lectures have become unpopular and have been phased out and replaced by conferences, rap sessions and other euphemistic alternatives.

Student dissection is a highly useful and effective learning experience, for only in this way can the human body be understood in all its dimensions, which is the object of their future professional endeavors. Clinicians, especially the surgical specialists who are concerned with structure, can readily understand its importance. We should not permit philosophers, behaviorists and others to curtail or delete

the important benefits derived from student dissection. Prosection and audiovisual aids including television, tapes, slides and models serve as valuable adjuncts to the introduction and review of material, but should not be considered total substitutes for primary teaching to replace either lecture or dissection.

Functional and practical correlation can readily be attained by using experienced surgical staff to serve as both lecturers and instructors during the student dissection periods. Preparation, willing cooperation and positive effort by all the participating faculty is required to achieve maximal benefit from this type of correlation. Orthopedists are able to provide excellent instruction and assistance during the dissection of bones, joints, extremities and the spine and can thereby easily correlate fractures, dislocations and radiographs with anatomic structure. Similarly, other surgical specialists can be used effectively during the study of their region of specialty. The radiology staff can provide exceptionally valuable instructional assistance by correlating angiograms with blood vessels as well as pertinent radiographs of the structures and organ systems as they are being dissected by the students. In the same manner, the interpretation of ultrasound and tomography studies can be correlated effectively.

Reevaluation of the adversary relationship between research and teaching should have a high priority [2]. It is necessary to again consider teaching a desirable and respectable skill and to establish and maintain a proper balance and proportion between instruction and research. Both are important functions of our medical schools and universities; yet, one cannot avoid the observation that in the contemporary academic world, the preponderance of consideration is being given to research efforts, especially when these provide large budgetary supplements. Nevertheless, we clinicians should require that all disciplines have a major commitment to teaching and an obligation to offer quality instruction in basic, correlative and practical information. Indeed, with the advances in microsurgery of blood vessels, nerves, free grafts and organ transplants and the use of angiograms, ultrasound and computed tomography, it is important to have *more, not less,* anatomy presentation and instruction in the medical curriculum. Schwartz [3] emphasized its importance by stating "sans anatomy—blindness."

In the current state of continuing decline, disarray and deemphasis of gross anatomy and the evident dissociation of many anatomy departments from basic and correlative teaching, there is much to recommend that anatomy instruction should be supervised or provided by clinical departments. Thus histology could effectively be taught by a pathology department, neuroanatomy by neurology and neurosurgery departments and gross anatomy by the department of surgery. Indeed, in this manner the course content would become more relevant and correlative and practical application more readily attained, despite paramedical and preclinical resistance.

It is recommended that surgeons review the timely and significant articles on medical education, curriculum, surgical training and practice by Zollinger [4,5], Dunphy [6,7], Moore [8] and Boyden [9].

## Summary

In recent years there has been an unfortunate trend to diminish the quality, content and instruction of gross anatomic structure in our medical schools. The preoccupation with cash-generated research has accelerated this decline and deemphasis. Research is necessary but should not be substituted for sound basic and practical instruction. In recent years departments of anatomy have become staffed and controlled by nonphysicians who often seem to have withdrawn from their medical school mission and have attempted to establish research institutes of ultrastructure, histochemistry and cell or experimental biology, and as a result display less than an altruistic and proportional interest in providing useful and medically correlative instruction to our future physicians. To reverse this unfavorable trend, clinicians must again resume their active traditional control of the medical curriculum and education. Clinical correlation of basic gross anatomic information is necessary and can, in fact, be readily attained by using clinicians, particularly surgeons, for anatomy staff and instructional purposes. The major factors contributing to the decline and deemphasis of the study of gross anatomic structure have been reviewed.

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