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HOW SURGERY SHOULD BE TAUGHT IN THE MODERN MEDICAL SCHOOL.*

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IT is obvious that no system of undergraduate instruction in surgery can hope to cover the entire field and send forth the new graduate competent both to advise and practice surgery. The teaching of surgery, therefore, naturally falls into two periods: (1) undergraduate teaching, (2) post-graduate teaching. It is of the first importance that these fields should be properly defined. Much time is wasted in our medical schools in minutiæ that would better be delegated to the post-graduate period.

The interests of two classes of students are to be considered. First, and most numerous are those who are destined for general practice or for the specialties which do not necessitate personal surgical work. The second class is made up of men who will ultimately become surgeons or will perform operations in connection with special lines of work that have more or less important surgical bearing. It is not desirable, however, to attempt to specialize to any extent in the type of instruction to be given to these two groups. The majority of undergraduates do not know, during their student days, to which group they belong. Their subsequent career is yet to be determined either by special ability or liking developed in medical school or by the character of the opportunities which arise after graduation. All students, therefore, must receive a training which will equip them to take either fork when they come to the parting ways. Moreover, a knowledge of the indication for surgery and its possibilities is quite as important to those who leave the actual performance of operative work to others as it is to the surgeon himself. Billroth's remark holds good today, that "the physician who proposes refusing to treat surgical patients and to attend solely to the treatment of internal diseases, must have some surgical knowledge, or he will make the gravest blunders." Up to a certain point the interests of all students in surgery are identical. To teach thoroughly this common groundwork should be the chief object of undergraduate instruction in this branch. The point of common interest is "what to do." "How to do it" is not so important except in emergency conditions, for it matters

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little whether the physician who knows what should be done knows also how to do it or delegates the actual performance to someone else who may be particularly skilled in this work. As a matter of fact, experience shows that the mortality from surgical conditions is due in far greater measure to ignorance or inattention to the indications for surgery than to the manner in which the actual work is carried out. There is vastly more poor judgment than poor surgery though there is an abundance of the latter. Defects in judgment which are not due to mental incapacity spring from ignorance of established underlying principles and the accumulated fundamental facts of empirical nature. If a medical school can produce graduates who think correctly and advise wisely in surgical diseases it will have accomplished its proper task. The development of surgical sense, of a correct understanding of the role of surgery in prevention and cure, should be the aim of instruction; while methods, procedures and handicraft are secondary considerations necessarily valuable in enforcing the lesson, but to be used only as a means to an end.

This conception does not in any sense contemplate the elimination of personal and so-called practical work by the student, nor does it seek to debar him from witnessing major operative work. On the contrary realizing that practice is always better then precept and "seeing is believing" it enhances the role of such methods in impressing their proper application to surgical problems. Operative work improperly magnified succeeds only in impressing the student with what may be done. Properly used and explained it lays siege to his understanding and reason, justifies itself and obliges him to consent with us as to the need, indications and benefits of operation. For it is in this matter of consent that surgery is hobbled. We must not forget that the average student shares the laity's aversion to extreme measures when the question becomes personal. He needs faith of the variety that moves mountains. If he leaves medical school without catching the spark it is probable that he will join the already great number of unbelievers and delayers, that inert mass which obstructs the diffusion of the benefits of surgery in early carcinoma, various digestive disorders and the host of diseases, the cure of which depends so largely upon timely surgery. If he goes out into the world feeling that a medical death is a visitation of Providence, while a surgical death is a stigma to all concerned, if therefore he employs the surgeon as a Lord High Executioner in cases brought to the brink of the grave by inaction, if he is willing to accept appalling risks of mortality to prevent operation, instead of a slight risk of operation to prevent mortality, it is largely because the surgical faculty of his School have failed to impress him with the true point of view and the correct role of surgery in prevention and cure. I often think of students on the benches as mourners who need the gospel of the aseptic scalpel to reclaim them from original sin. Conviction and conversion are the first and essential steps, if we would send them forth as missionaries filled with the saving grace of a belief in surgery.

A famous surgeon when asked upon one occasion as to the best recent book on surgery replied, "the latest work on physiology." Bland-Sutton in a recent address on "The Surgery of the Future," pointed out that "In pre-Listerian days the path to surgery lay through the dissecting room": . . . now "it requires little foresight to recognize that for men ambitious to attain high places in surgery, the high road lies through the pathological institute." This forecast recog-

nizes the fact that the mere craftsman is no longer entitled to be called a surgeon, that he must be a biologist, bacteriologist and pathologist. Especially must he know the new science of living pathology, of morbid processes in origin and progress, which owes its existence to the revelations of the surgeon and has done so much to increase our knowledge of disease.

Any course in surgery which does not prominently recognize the changed relation between the head and hand of the surgeon is not modern and is not satisfactory. Students should not be required to familiarize themselves with details of operation in any but the more common minor procedures and major operations of urgency and necessity. A few exceptions to this rule may be made in the case of thoroughly standardized operations for most common and important conditions. Exceptions should be jealously guarded, however, since they encroach upon time more profitably spent upon groundwork. The fundamentals of practical surgery should receive adequate attention to the exclusion of the more highly developed application of the art. It is taken for granted that the prerequisite courses in surgical bacteriology, anatomy and pathology have been covered before or during the early portion of the time devoted to clinical instruction.

The aspects of surgery which should especially engage the students' attention are:

(1) Familiarity with diseases having surgical aspects, their etiology, symptomatology and diagnosis. Their frequency and relative importance; the prognosis, immediate and remote; and the respective values of medical and surgical treatment.

(2) The principles of surgical treatment. To produce thinking men it is necessary to give them an insight into the rationale of the art. This should be done by demonstrations as well as by lectures whenever possible. Such facts of surgical physiology as can be shown to classes or groups will go a long way in establishing a practical working grasp of the subjects illustrated. The phenomena of shock are easily demonstrated and are impressive. So also are the consequences of intestinal obstruction and the student who has observed the rapid changes in the bowel and the severe toxemia that early manifests itself in obstructive conditions will need but little in the way of precept or urging to arouse him to the necessity of prompt recognition and equally prompt action in such cases.

(3) A general knowledge of the procedures, operative or otherwise employed in surgical treatment. Actual demonstrations should be given, personal work allotted and detailed familiarity required in particular instances to be chosen because of their common and necessary character or with a purpose to illustrate important principles. Examples of such procedures are, paracentesis, the uses of saline solution, subcutaneous, intravenous and intrarectal, bandaging and dressings, plaster, splints and extensions, drainage, anesthesia, general and local, antisepsis and asepsis, artificial respiration, control of hemorrhage, hypodermatic medication, thermal agents and counter-irritants, ligatures and sutures, postural uses and devices, preparations for operation. Operative details should be taught in ligation of main arteries, incision of abscesses, suture of wounds, the handling of com-

pound fractures, circumcision, tracheotomy, amputations, herniotomy, repair of intestinal wounds and perforations, gastro-enterostomy, cholecystostomy and appendectomy.

The methods of instruction to be adopted by each school depend in very considerable degree upon the type of students, which in turn depends upon the situation, reputation and requirements of the school. Schools which admit only men of more advanced preparation who are usually somewhat older and have a liking for and familiarity with the student life can successfully employ the "University method" of offering correct guidance and adequate opportunities for instruction, in the confident anticipation that results will come from the conscientious application of the students. Some men will lag under this plan but this disadvantage is more than balanced by the great benefits of the method to the average and stronger men.

On the other hand, schools whose student body is made up chiefly of raw recruits, who are entering at a very early age upon the study of medicine, without adequate preliminary grounding or understanding of the demands made by the thorough study of modern medicine, must teach down to its average. Less can be taken for granted and more must be required. A more rigid curriculum must be framed and more prods in the form of quizzes, tests, and examinations will be necessary if a fair average result of knowledge and efficiency is to be reached. Students of exceptional ability suffer by being cramped into such narrow limits, but, as they are in the minority as a rule, they must submit to the good of the majority. Experience has shown that in later years such men frequently rise to eminence, which must be attributed to this individuality rather than to their poor start.

In an intermediate group may be found many of our colleges which are raising or have raised their requirements to a point which brings together a rather heterogeneous group of men, some of whom enter with advanced preparation while others have complied with the letter of the law in entrance requirements, but are still in their swaddling clothes so far as being able to study is concerned. For such schools the effort to preserve a proper balance between what is good for one group but unsatisfactory for the other is a difficult problem, and may result in such a lack of well-defined plans as to suit neither. Homogeneity of the student body should be the aim of those having in charge the admission of students to our medical colleges, and the curriculum and methods of teaching should take their cue from the type of student and a very definite idea of the way in which he is to serve the community. It is at the present time neither possible nor desirable under the differing circumstances of population and mode of life in the United States to place all schools upon the higher plane of requirements and instruction. This would necessitate homogeneity of the population which is incapable of regulation.

In any event, if it be granted that as Aristotle said, "the direction in which education starts a man will determine his future life," and, if it be further conceded that however thorough the student's preparation, however good his instruction, however excellent the opportunities and facilities afforded by his school, nevertheless, at graduation he is a babe whose possibilities depend entirely upon his subsequent development. It must also be realized that any plan of instruction which is designed to take up the student bodily and carry him along willy nilly to the moment of graduation, while it may leave him in possession of what his instructors have found by experience to be

the most essential practical parts of medical knowledge, nevertheless leaves him stranded like Moses in the bulrushes, with all the possibilities of development into a man but without the habit of self-reliance, the vision to discriminate, the ambition to energize and the ability to execute alone.

Teaching, to attain its highest function, must be more than instruction in the parts of knowledge. It must be inspirational and it must show the student *how* to acquire knowledge. The trend of events is therefore inevitably towards the "university method" of teaching.

More specifically, surgical instruction is carried on through the medium of:

1. Didactic lectures.
2. Dry clinics.
3. Operative clinics.
4. Ward classes.
5. Ward work.
6. Dispensary work.
7. Conferences and recitations.
8. The performance of operations upon animals and the cadaver.
9. Surgical research groups.
10. Collateral reading.
11. Analysis of cases and reference work.

I. Didactic lectures should be reduced to a minimum, but not discarded. The existence of numerous text books makes any attempt to be encyclopedic an enormous waste of time. As a means of supplying perspective to the groping student they are invaluable. They should buoy his course through the sea of detail. They should aim to develop the reason rather than the memory and should vitalize and inspire his work rather than attempt to supply a syllabus of all needed information.

II. The dry clinic or exhibition of important and interesting cases with accompanying comments is invaluable. In them the student has an opportunity to observe the manner in which the experienced mind works and by example sets his own working along similar lines. In the development of the case also much general knowledge may be given in a way that tends to remain because of the concrete illustration.

III. The old-fashioned operative clinic to a body of men has outlived its usefulness. Its inspirational value was great and it still possesses some advantages of this sort. Though formerly regarded as a means of demonstrating technique and methods of operation, its chief value today lies in the opportunity which it gives of making a complete exposition of a case including the visual demonstration of the lesion. It follows that only those who can see derive the greatest benefit from the operative clinic. That groups should be small enough to be accommodated close to the table, that cases whose interest is purely operative should be few, and that such clinics should be given only by those who possess the gift of exposition as well as the ability to operate. Time can be economized and much better results achieved for the student, if the case is turned over to a competent assistant for the completion of the technique while the surgeon makes a discussion of the general and special aspects of the case.

IV. Ward classes, or visits with small groups of students should be largely used; as in this way opportunity is given for direct exam-

ination and informal discussion of the various aspects of surgery and for a direct contact with the student that is helpful to the instructor in estimating his man, and for the student in transmuting what he has heard or read into actual practice, a most difficult kind of alchemy to the average man. The special subjects for demonstration should be divided up among the men who conduct ward classes in order that, as occasion arises, they may be carefully and adequately considered. This also locates responsibility for necessary matters of instruction which otherwise might easily be overlooked. The obverse of this is to define within certain limits the respective fields of instructors in order that continual overlapping on common subjects may be avoided.

V. Ward work. If opportunity exists it is well to assign a certain amount of work in connection with given cases to each student. He may be held responsible for knowledge of their condition and in general for the diagnostic and therapeutic aspects of the disease. This may be drawn upon in ward classes.

The importance of requiring the student to follow actual cases from admission to discharge is great and the interest of the student and the force of the instruction is much increased if he is allowed to have a minor assistancy in the operation. When occasion permits he may be allowed to attend to the after treatment, removing stitches, applying drainage, etc. The early impressions of work of this sort remain forever.

VI. Routine work in the dispensary should be required of all students. In every active dispensary the more common types of ambulatory surgical cases are numerous and with competent and interested instructors there is no form of surgical treatment which is more valuable. Minor operations and anesthetics may be demonstrated with advantage here.

VII. Conferences and recitations should proceed hand in hand with lectures, clinics and practical work in all important subjects. They are valuable alike in clearing up hazy points for the better students and in prodding the weaker brethren. They should serve the purpose of a review, and must not be allowed to degenerate into a question and answer primary recitation.

VIII. A certain minimum of operative work should be required of all students and in our opinion at least a portion of this should be carried out upon the living animal. It is high time that the community should recognize what they all know and the vast sane majority will admit, that we are engaged in preparing men who will deal with lives. We are obliged to guarantee to the best of our ability that in certain emergencies they will not be found wanting. There is only one way to learn how to do a thing well and that is to do it. Surgery on the cadaver is so different from surgery upon the living that it is a poor and unsatisfactory substitute. It has a field in demonstrating the A, B, C's of technique and the anatomy of the parts, but work upon the dead can never reproduce the conditions that must be met in work upon the living. It is morally wrong for the student or graduate to learn technique at the risk of human life. This is a form of experimentation which we cannot countenance. It is our right, nay more, our duty to use suitable lower animals for this purpose and we cannot believe that we will not be supported in this attitude. The people entrust us with their lives because of their belief in our morals and principles. Will they not also entrust us with this problem which is so closely related? Let us join forces, put our shoulder to

the wheel of progress and we will find that when the people express their views it will be found safely and unmistakably on the side of truth and right. The opposition to the use of animals is comparable only to that blind objection to the dissection of the human body which hampered progress for years, and which if not overcome would have precluded all the development of surgery, as happened in China where the anatomy of the arteries was partially worked out by the chance wounding of the vessels in acupuncture.

Any sensible person who is so unfortunate as to require an operation would prefer to have it done by a man who had mastered its details upon the animal rather than entrust himself to one who had no operative experience. It is true that "a good cause can sustain itself upon a temperate dispute" but we have been too lax to argue the question. It is true that we have not trusted to the common sense of the people in vain, but it is time now to claim the benefits to be derived from a proper extension of this work. Animal experimentation in simple form by selected students under supervision has justified itself and should be continued.

IX. Collateral reading.—Every medical school should have a reference library within easy access of the students and the habit of consulting references should be encouraged in every way possible. The use of the Index Medicus and of the monumental Index Catalogue of the Library of the Surgeon General of Congress should be familiar to every student. The importance of monographs and original journal articles should be emphasized. The need of French and German will be made clear and those who are fortunate enough to possess a reading knowledge of these languages should be enjoined to keep up by regular perusal of foreign journals, if only for a few minutes each day. The habit of amplifying what one has seen or learned during the day by reading is probably the most valuable and the most neglected feature of education in our schools.

X. Like collateral reading a requirement of a certain amount of small original or analytical work on the part of the student would be most valuable in its educational aspect, and in many instances in its influence upon the future productiveness of the student. One method of accomplishing this is the formation of student societies under the patronage of a member of the faculty in whose meetings interesting cases are detailed and discussed, while papers upon miscellaneous medical subjects are composed and read. The Undergraduate Medical Association of the University of Pennsylvania every year presents a full day's program consisting of papers which are the outcome of literary or experimental research. It is from the men who thus get their start in productive work that the leaders of the future will be recruited.

In the last year of study several electives should be offered in all major branches. By this time certain men have developed a definite bias towards medicine, surgery or research, and it is well to offer opportunities for more advanced work or intensive study in the branch to which they are especially attracted. Surgical electives may be offered in the laboratory of experimental surgery or by the clinical men in subjects of special interest, such as rectal examinations and diagnosis, abdominal diagnosis, etc.

The proper correlation and assignment of these various functions in the way of time and personnel of the instructors is a matter of great practical difficulty. The direction of the various activities is

a matter of executive rather than of surgical ability, though it goes without saying that a full surgical knowledge is necessary to appreciate relative values and properly apportion the work. The successful working of any scheme that may be devised will depend largely upon the organization of the surgical faculty and the fidelity with which the various roles are carried out.

In the space of this paper we have been unable to do more than to sketch briefly the components and spirit of the modern course in surgery. In our general conclusions we have had the benefit of the experience and advice of the John Rhea Barton Professor of Surgery of the University of Pennsylvania, Dr. Edward Martin, and the opinions here presented may be considered as representing in outline the practice and the aims and ideals of the surgical instruction in the University. It is our belief still that "of a good beginning cometh a good ending" and that if we teach men to regard surgery correctly as a science rather than a mechanical art, to estimate its values and not over-estimate its dangers, to stand firmly upon conviction and not vacillate from weakness we may rest assured that whatever path they choose they will render the maximum service.

CARCINOMA OF THE INTESTINES.*

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I will not present a paper. I merely want to present some specimens and make a few remarks on the question of carcinoma of the intestine. Carcinoma of the intestine is certainly not a rare disease or rare condition and its gives symptoms sufficiently plain and definite if we go into the history carefully to make a diagnosis much earlier than we usually do.

At present there is a general crusade looking to the early operation for carcinoma. The breast and stomach particularly have been drawn to our attention as the site of carcinoma and we are constantly looking for the disease in these two organs, but in the intestinal tract beyond the stomach much less has been said of the occurrence of cancer, but here it is certainly not a rare disease; maybe not as common as in the stomach, but it comes to us quite frequently, but, as a rule, it comes to us rather late and the removal of the disease is not followed by cure. It does seem, though, that if we get these cases of malignancy of the large intestine in a fairly early stage we have reason to look for a cure and a lasting cure. I have one case now eight years after a removal of the rectum for carcinoma. I have a case nine years after removal of the cecum for carcinoma. I have several cases of intermediate periods. I have more cases, unfortunately, that don't come under the head of being with us.

This specimen was taken from a lady 56 years of age who first came under my care complaining of distress in the left iliac fossa with the passage of mucus and blood. Proctoscopic examination showed numerous polyps on the mucous membrane and I removed one of those and it was declared non-malignant. Dr. Merzbach saw

* Presented before the Brooklyn Pathological Society, December 10, 1914.