

FACTORS WHICH CONTRIBUTE TO A REDUC- TION IN MORTALITY IN ABDOMINAL SURGERY

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In submitting this subject for discussion, I do not hope to offer anything new, but desire merely to present an outline, an approach to which has served to reduce my mortality and to improve my results in other respects.

In offering surgical relief in an individual instance, we should be prepared to give the following reasonable and adequate assurance:

First.—That the risk to life, as this particular operation is to be done, is not out of proportion to the gravity of the disease. What chiefly concerns a patient undergoing operation is the risk to which she is subjected by the given surgeon with the facilities at his command, and not the death rate from this particular operation as done by the masters of surgery. In surgery, as in every other sphere of human endeavor, the element of personal equation largely determines results—one operator will habitually have a low mortality, another will achieve an occasional brilliant result, while the work of still another will always be mediocre. The patient who submits to an abdominal operation stakes her life on the ability of the operator to command proper facilities and to do consistently high-grade work.

Second.—That if the patient recovers from operation, there should be no essential reason why she should not

have the desired relief—i. e., that the patient should not be subjected to the risk of a grave operation if she can not be cured of the disease, as is the case in advanced cancer. It would be unwise, also, to remove a uterus for fibroid tumor, if coincident and grave cardiac, pulmonary or renal disease would almost certainly cause permanent invalidism, and if the depression incident to operation might easily prove fatal.

Third.—That the conditions under which operation is to be done should be such that no other combination of circumstances could offer less risk to life, or a greater degree of security against postoperative complications.

Fourth.—That in removing one type of pathology we may be able to avoid substituting another type which might readily entail greater discomfort and danger than that removed. A patient who exchanges a retroverted uterus for an incisional hernia or serious intestinal adhesions can scarcely be said to have profited by the exchange. Such unfortunate results will undoubtedly be encountered occasionally by the most careful, skilful, earnest and successful surgeons. If such occurrences are rare, it may be wise for a patient to take the slight risk—but if in individual hands they occur with marked regularity the risk under such conditions is manifestly out of proportion to the benefit which may be reasonably expected.

Fifth.—That no other less onerous kind of treatment could effect the desired result in a more satisfactory way. For example, salpingitis and pelvic peritonitis often may be completely cured by a relatively short period of rest and medical treatment. Precipitate removal of diseased organs under such conditions would be manifestly unwise. It often happens that a well-fitting pessary completely relieves the discomfort due to uterine displacements; on the other hand, one often finds the perineum so badly damaged that no type of pessary can be retained. Under these conditions safe surgical correction is desirable.

Sixth.—That the benefit to be derived from operation should reasonably be expected to compensate the patient fully for the risk to life, discomfort, loss of time, inconvenience, degree and duration of disability, and the cost of operation and still leave a decided balance of benefit to the patient's credit. The simplicity of the procedure and the success of the operator in the surroundings and under the conditions which exist should be such as to afford adequate warrant for the belief that a high degree of success will attend this particular operation on this particular patient.

Just in proportion as a surgeon is accurate in these estimates will his judgment be good, his counsel wise, and his results satisfactory.

I am fully aware that such restrictions imply a degree of skill and judgment that it is difficult to acquire. Yet the moral law and statutes confer on us broad privileges in handling human lives provided we recognize and respect the sacred trust such privileges entail. If we respect those laws we must realize that many factors contribute to a high percentage of recovery with ideal convalescence. Chief among them are a due appreciation of the functional value of anatomic structures, a comprehensive knowledge of the principles of pathology, the recognition and correct interpretation of gross pathologic lesions in the living subject, an intimate knowledge of the habits and accidents common to the structures with which we come in contact, a correct estimate of the patient's reserve strength, a wise choice of time and type of operation, a rigid aseptic technic, a considerable degree of manipulative dexterity and such *esprit de corps* among one's group of coworkers as will permit of operative speed and precision.

It is clear that to accomplish these aims necessitates a fortunate combination of time, adequate facilities, proper training, special aptitude, and assiduous application. Yet they are the requisites of uniform success and

as such constitute the most important factors in the prophylaxis of postoperative morbidity and in the reduction of mortality.

A comprehensive knowledge of the fundamental principles of pathology is essential to a correct interpretation of a given morbid process; to a forecast of its further course; and to a fair estimate of its present and future effect on the patient in question.

ACCURATE KNOWLEDGE OF THE NATURE, EXTENT AND TREND OF DISEASE

While it is practically impossible to make an exact diagnosis in every case before opening the abdomen, the careful and well-trained surgeon should be sure of the intra-abdominal condition in from 90 to 95 per cent. of cases. In estimating the needs of the individual patient it is not sufficient merely to know the nature of the disease for which relief is sought. One should know as well the influence it is having on the host, and also the extent to which it is modified by other pathologic processes affecting the individual. Should there be no other associated disease, it is still necessary to have exact knowledge regarding the lesion under consideration. The several stages through which the pathologic process passes, and the varying influence it exerts, make such knowledge essential to a wise handling of the disease.

Every type of pathologic process affecting the pelvic organs affords striking and frequent examples of the foregoing propositions. For instance, one's conception of early carcinoma of the fundus of the uterus which has scarcely invaded the muscular wall is entirely different from that of advanced adenocarcinoma of the cervix which quickly invades the parametrium and gives distant metastatic involvement. The treatment based on this conception differs quite as widely. Immediate hysterectomy in the first instance may be accomplished with little risk and is exceedingly likely to yield a radical cure. In our present state of knowledge one could hardly excuse a hysterectomy for advanced adenocarcinoma

of the cervix and surrounding structures which would be attended by great risk to life and scarcely a possibility of even temporary relief.

One familiar with the progress and clinical aspect of varying types of uterine fibroids should reasonably expect to forecast the future course of events in an individual instance with the same degree of precision that the astute clinician anticipates complications in the course of pneumonia, diabetes, nephritis, arteriosclerosis, etc. For instance, if a patient of 37 or over has a growing interstitial or submucous fibroid, and for a year or more has lost an increasing quantity of blood, it is not necessary to permit the development of marked anemia with cardiac and vascular changes, nephritis, etc., before realizing that she represents a clinical type, tending inevitably to that end. On the other hand, a woman of like age or younger, with a small inoffensive subserous fibroid need not, at some risk, forfeit her chance of becoming a mother, by unnecessary haste in operation. A mere reference to such contrast of cases might seem out of place in this presence, and yet in my experience fully 40 per cent. of fibroids that have come to operation have shown some form of degeneration of the tumor, or serious cardiac, vascular or nephritic changes. Manifestly the time of election for operation comes before there is such debility as to retard convalescence.

The need for precise and comprehensive diagnosis is especially great in dealing with inflammatory affections of the genital tract—thus the outcome and hence the treatment may differ widely in such pathologic processes as true cellulitis with dense inflammatory exudate, on the one hand, and salpingitis, on the other. In each of these affections the best course to pursue may vary materially with the duration, extent and trend of the disease.

Equally wide differences in clinical aspects and treatment may arise in the course of such affections as ovarian cysts and tubal pregnancy.

**EXACT DETERMINATION OF THE PATIENT'S RESERVE
STRENGTH**

The most frequent, the most perplexing and at the same time the most important decision the surgeon is called on to make relates to the margin of reserve strength possessed by the individual patient and the extent to which that margin will be encroached on by the method of obtaining relief. He must recognize the fact that a definite percentage of reserve strength is essential to the absolute needs of existence. It is evident that the energy that may with safety be dissipated by operation must come from this margin of reserve strength above the absolute needs of existence. The risk of operation increases just in proportion as this margin is encroached on. It is important that surgeons should analyze the composite picture of reserve strength and strive diligently to reduce it to an exact analysis. It is clear that this margin depends on the functional value of all the vital organs, including the musculature.

It is usually possible to determine the functional value of each of these several structures by well-known clinical methods. To eliminate the element of chance it is essential that such clinical methods should be habitually and systematically employed. There would seem to be, however, a small percentage of cases in which the available tests are inadequate, notably those in which sudden death occurs in the course of what appears to be a perfectly normal convalescence, with or without evident fatal embolism; postoperative nephritis occurring in what appeared to be previously healthy kidneys; and rare evidences of death due to acidosis, the urine having previously been free from sugar, diacetic acid, and other abnormal constituents.

**JUDICIOUS ADAPTATION OF TIME AND TYPE OF OPERA-
TION TO INDIVIDUAL NEEDS**

The wise adaptation of the time and type of operation to individual needs is essential to uniform success. It

demands prompt decision and constitutes the severest test to which a surgeon's judgment is put.

It is not always easy to refrain from surgical intervention when a patient lies critically ill and is apparently growing worse from an intra-abdominal affection which will clearly demand operation at some stage of its existence. Yet if we except accidents and injuries to hollow viscera—strangulated hernia, perforation, etc.—it seems clear to me that an increasing percentage of so-called emergency work can be reduced to the safer planes of incomplete and elective surgery. In all surgery there is scarcely a more hazardous procedure than the removal of a large universally adherent, infected ovarian cyst at the height of an acute and exhausting illness. It often happens, however, that evacuation renders subsequent removal simple and safe. At times such an emergency as torsion of the pedicle of an ovarian cyst is rendered more serious by a severe complicating nephritis. To withhold surgical relief may seem a hazardous procedure and yet it is often surprising to see the marked improvement which follows delay and restored renal activity. It occasionally happens that the completion of an operation would probably prove fatal, whereas temporary failure may later be followed by safe operation.

When pronounced anemia and cardiac and renal complications accompany uterine fibroids the most gratifying results are often attendant on a few weeks of preliminary treatment. A number of patients who had for some months been going progressively down until they were almost exhausted have improved sufficiently to permit of safe hysterectomy and speedy convalescence, whereas more precipitate operation might readily have proved fatal.

My conviction daily grows more firm that by converting acute inflammatory affections of pelvic structures into aseptic lesions the need for operation and the post-operative morbidity and mortality may be greatly reduced. This conviction is based on an increasing num-

ber of complete recoveries without operation and a series of 475 consecutive abdominal sections for inflammatory lesions of tubal origin with only four deaths.

When operation is done while inflammatory exudate still infiltrates intestinal walls, injury with subsequent fecal fistula, adhesions and intestinal obstruction, are far more common than when internal sterilization of pus (tubes) is practiced. In the series of cases just referred to (475 sections for quiescent inflammatory products) there have been only two cases of partial intestinal obstruction. One of these was subsequently relieved by operation. The other did not require it. These four complications occurred in cases in which operation was done relatively soon after the acute attack had subsided—that is, just as the last of the exudate was being absorbed. During the period in which these sections were being done for inflammatory lesions something more than a thousand sections were done for other types of pathology without a single fecal fistula, and, so far as I know, with only one case of partial intestinal obstruction, which occurred two years later.

A GROUP OF COMPETENT COWORKERS

I consider the proper organization of a surgical service an important factor in the reduction of mortality. The method which seems entirely satisfactory in my service at the Allegheny General Hospital consists in dividing the work into several departments and having a corps of competent and continuous workers in each. The corps of workers consists of:

1. A thoroughly reliable and efficient first assistant is, I believe, essential to quick, precise work and uniform success. Dr. S. A. Chalfant, who was anesthetist for a considerable period of time, has occupied the position of first assistant for a number of years.

2. A skilled anesthetist, on salary, who, in addition to giving all anesthetics, is responsible for a typewritten record, embodying all details regarding diagnosis, opera-

tion, pathologic lesions found at operation and a description of specimens removed. It is his further duty to keep tabulated records of postoperative facts in any way due to the administration of the anesthetic.

3. A pathologic department consisting of an expert pathologist cooperating with the pathologist of the institution and having a competent salaried assistant. Among other things, it is customary to have routine examinations of blood at stated intervals before and after operation, and at other times if occasion arises; to examine the urine before operation and each 24 hours thereafter for two or three days, or as long as any abnormal constituents are found. The routine urinalysis embraces among other things a quantitative estimate of the acetone bodies both before and after operation; systematic bacteriologic investigations and histologic examinations of specimens and discharges are made.

4. The Nursing Corps.—Much depends on the proper organization of one's corps of nurses. A group of intelligent, earnest, systematic, diligent nurses, who take a deep personal interest in promoting the comfort, security and welfare of each patient, contributes much to the efficiency of one's work. The arrangement we have had at the Allegheny General Hospital has proved satisfactory in method and personnel. (a) There are efficient graduate head nurses in charge of the private and ward floors. They have the usual group of undergraduates. (b) An unusually competent graduate nurse has for a number of years been in charge of the operating room and of the preparation of all dressings used therein. She also prepares the field of operation in clean cases. She has two undergraduate assistants. (3) A plan which I can not commend too highly is the employment of a continuous group of postoperative nurses chosen because of especial aptitude and fitness for this particular type of work. Each patient subjected to abdominal section should be under the care of such a competent graduate day and night nurse for the first 48

hours, or as much longer as the patient's condition may demand. They add much to the comfort, and, by being skilled and alert, to the safety of patients. Private patients gladly pay for this service—the hospital supplies it to charity patients.

MINIMUM AMOUNT OF ANESTHETIC

Undoubtedly one of the most important advances in major surgery during the last century was the introduction of anesthetics. During the last decade one of the most important advances has been the uniform and progressive tendency to reduce the quantity of anesthetic. This has resulted from a better understanding of the frequency, nature and extent of the deleterious effects they cause. It has been accomplished by the employment of skilled anesthetists, by the adoption of better methods of administration and by such improvement of team work in operative technic as reduces the duration of operation.

While fully recognizing the extent of our indebtedness for anesthetics, and to those who introduced them, we must not lose sight of the fact that, while doing immense good, anesthetics usually cause distinctly harmful results. These results are expressed in a definite clinical picture which is always present but in varying degrees. One almost invariably sees marked muscular depression and interference with glandular secretion as evidenced by parched lips, intense thirst, usually nausea and vomiting, and a reduced quantity of urine.

When this disturbance is more marked the air passages may become affected, the circulatory system depressed, metabolic disturbances occur, and hepatic and renal functions may be markedly or even seriously vitiated.

The more thoroughly one investigates these subjects by careful observation of symptoms and systematic preoperative and postoperative analysis of secretions, the more fully does one realize that the anesthetic is per-

haps the most important factor in determining operative mortality. The truth of this proposition has repeatedly been demonstrated to my entire satisfaction by contrasting the postoperative condition of two classes of patients: The one class embraces such operations as appendectomy, cholelithiasis, hysterectomy for fibroid, etc., on good subjects under ether anesthesia. The other class includes a number of patients operated on for gallstones, large adherent ovarian cysts, appendicitis, etc., who were also the subjects of such grave cardiac, renal or pulmonary disease as positively contraindicated the use of a general anesthetic. The observation has been so common as to be almost universal, that in the grave cases without anesthesia the patients were some hours later, in much better condition than the patients in the simpler cases to whom ether was given, and that convalescence was almost uniformly more smooth and satisfactory. I would emphasize the fact that this striking difference was in favor of the patients who would almost certainly have died had a general anesthetic been administered.

The method we have found most satisfactory has been the continuous services of a skilled and salaried anesthetist who uses the open or drop method, with the coincident administration of oxygen, using a soft catheter introduced through the nose. The use of oxygen in this way has, among other things, almost done away with nausea and vomiting.

I believe that a full appreciation of the possible harm that might result from the administration of anesthetics, and a careful study of the circulatory, respiratory and urinary tracts before operation, has contributed no little to the maintenance of a low operative mortality in my service. It has also done much to reduce the frequency and severity of such postoperative complications as are attributable to this cause. Pneumonia and bronchitis are exceedingly rare; shock and other circulatory disturbances are almost never seen, and urinary complica-

tions are much less frequent and serious than formerly. There have been only 13 deaths (1.86 per cent. mortality) in the last 700 consecutive laparotomies.

RIGID ASEPTIC TECHNIC

A rigid aseptic technic is unquestionably the foundation on which all modern surgery rests. Without it there can be no uniform success. Without it the certainty, nature and extent of postoperative complications is such as to render elective surgery rarely, if ever, justifiable. The development of a rigid aseptic technic demands that the surgeon, his assistants and all others who come in contact with the field of operation during the period of preparation, operation or postoperative care, shall absolutely avoid contact with any wound, dressing, receptacle, or other structure or article which is not surgically clean. This implies the use of sterile rubber gloves in all physical examinations of patients, presumably free from open foci of infection. It implies even more rigid care in examinations made in the presence of discharges from open wounds. Uniform aseptic success demands that such precautions be taken every day in the year; so that the most important instruments concerned in operation, the hands and their covering, shall remain as nearly aseptic as possible. The hands having been kept continuously clean, the risk of infection is further reduced by the use of well-fitting rubber gloves of good fiber. These principles apply with equal force to the operator, his assistants, the nurses in the operating room and those who have the care of the field of operation. Such a rigid aseptic technic forces on us recognition of the undoubted fact that hospitals are clearing houses for all types of infection. With rigid technic, proper segregation of patients, and such division of labor as precludes the intermingling of caretakers of septic and clean patients, it is easily possible to do elective work with uniform aseptic results. We should never lose sight of the fact, however, that when

the least relaxation occurs the conditions are analogous to those which exist when a powder mill and a match factory are operating under a single roof.

SPEED WITH PRECISION

If a surgeon is called on to operate at a distance, in a definite and considerable percentage of cases, he will lack essential facts which should guide him in deciding for or against operation, the type of procedure to be employed, and the time of election and the conditions under which it should be done. If he operates under such conditions, the death rate will be unnecessarily high. If he declines to operate, an embarrassing situation arises.

I can not too strongly commend the wisdom of operating habitually in one's accustomed surroundings. By doing so and exercising constant effort to develop systematic methods, it becomes possible to have the duties of one's coworkers proceed with clockwork precision.

With such a well-organized corps of workers, the division of labor may reach such a degree of efficiency that the operator may concentrate his entire attention on his individual work—arriving with unnecessary interruption at prompt decision regarding the fate and function of structures, the type of operation best suited to individual needs, and essential methods of technic.

By such an arrangement, one will more uniformly do the operation best suited to individual needs; good team work, celerity and precision reduce the time required for operation, the quantity of anesthetic employed and the possibility of such accidents as slipping ligatures, losing pads, peritonitis, infected pedicles, stitch abscesses, etc. In one's accustomed surroundings, where a definite, systematic and careful technic is employed, it is rarely necessary to improvise. He is a poor surgeon who can not improvise if an emergency demands it. He is a poorer one who habitually or frequently allows himself to be placed in such a position that he must improvise. The act of improvising is evidence that an operator is

substituting an inferior method of procedure for one he would prefer to employ in the individual case. While untoward results may rarely follow, ample room exists for the element of chance to enter.

The evolution of systematic methods and technic employed in operating rooms will necessarily vary according to individual requirements. The simple technic which has proved satisfactory in my operating room at the Allegheny General Hospital is briefly as follows:

In order to reduce the chance of transmitting infection to a minimum only three persons are supposed to have clean hands—the operator, the first assistant, and interne; they scrub their hands with soap and running water for twenty minutes, and then use such chemical antiseptics as will not injure the skin. Solutions of potassium permanganate, oxalic acid, bichlorid of mercury and, finally, alcohol being the sequence preferred, but if either of these solutions is irritating to the skin it is omitted.

All instruments and dressings used during operation are taken directly from the sterilizer by the first assistant. The arrangement of dressings and of instruments in trays and on tables is always exactly the same, thus enabling any one connected with the operation to find a desired article without a moment of hesitation.

In order to avoid unnecessary handling and consequently arousing of patients, they are anesthetized on the operating table, which is then rolled into the operating room.

While the first assistant is arranging instruments and dressings, the head nurse has the patient placed in proper position so that the interne proceeds at once to cleanse the field of operation. While the operator adjusts protecting sterile cloths, the first assistant verifies the count of abdominal pads and the head nurse places the instrument and dressing tables in their respective places.

The instrument table is placed within reach of the operator; as the instruments always occupy exactly the same position in the several trays it is easy to pick up any desired instrument without even turning the head. The first assistant having verified the number of pads available for use, must account at the end of operation for the number, which must always be a multiple of five. In order to avoid error, as soiled pads are discarded, the head nurse has one of her assistants collect these pads and pin them together in sets of five. These sets are then arranged in definite order so that with the greatest economy of time the head nurse may at any moment give the correct count of discarded pads. To this number the first assistant adds those in his keeping. If the aggregate is not a multiple of five, one or more pads must be found within the abdomen or elsewhere. So far as we know, a pad has never been left within the abdominal cavity, though without such a definite system I am confident such an accident would probably have happened.

The instruments, needles and suture materials are in the hands of the interne. It is our desire to simplify methods so far as possible, so only four types of needles are used. Each needle has its definite purpose. It always carries its definite kind of sutures—the suture material employed is limited to silkworm gut, celluloid linen No. 1, and the finest catgut, that will give a fair degree of tensile strength. We usually employ commercial catgut which is contained in hermetic glass tubes and is supposed to be sterile. Before using, however, the tubes are boiled for half an hour on two successive days.

It is my belief that the head nurse can accomplish most by being free to adjust the patient, to arrange instrument and dressing tables, irrigating stands, solutions, intravenous sets, hypodermics, if needed, supervise the counting of pads, send specimens to the laboratory for immediate frozen section, etc. We accordingly prefer that she should not have sterile hands.

The head nurse and her two assistants make all dressings used in the operating room—and see that a supply of all appliances used is constantly at hand.

It is our desire to make the postoperative treatment of patients as simple as possible, especially to minimize, so far as possible, the petty annoyances which disturb patients unnecessarily, etc. They are kept as quiet as possible, they are rarely catheterized—ice is usually applied to the abdomen—continuous enteroclysis, normal salt solution, Murphy method often serves a valuable purpose. The patient's position may be about what she wishes, unless there is some especial reason to avoid moving, such, for instance, as the use of drainage.

CONCLUSIONS

In conclusion, I believe that an accurate knowledge of the nature, extent and trend of disease, and exact determination of the patient's margin of reserve strength; a judicious adaptation of the time and type of operation to individual needs; a group of competent operative coworkers; a minimum amount of anesthetic; a rigid aseptic technic; and speed with precision, are factors which will yield a low mortality and highly satisfactory operative results.

ABSTRACT OF DISCUSSION

DR. C. A. L. REED, Cincinnati: Operative celerity consistent with the safety and precision of operation, with reference not only to minimizing the time but the amount of the anesthesia, is a matter that cannot be emphasized too strongly. I was invited for three o'clock one afternoon some time ago to witness an operation that was done in the patient's house, where it ought not to have been done. I arrived nearly half an hour late, expecting that the hysterectomy would have been concluded. I not only was not too late, but I had the opportunity of holding a coal oil lamp for over an hour after nightfall until the operator got through with his work. It is needless to say that the patient died. Recently a patient was kept under anesthesia for a simple perineorrhaphy for 2½ hours. Operations of that kind are being done with a frequency that is alarming, and the sooner this Association states its disapproval of this slovenly method the better. I have

been in operating theaters, with good operators in charge, in which I have seen the surgeon, instead of paying strict attention to his business, engage in conversation with those about him, while the patient was being kept under an anesthetic, thus unnecessarily and dangerously prolonging the period of operation. I recall with pleasure that celerity was one of the great points constantly emphasized and exemplified by the late Lawson Tait, than whom no more successful operator ever lived. Those who had the privilege of seeing him operate will recall with what promptness he did his operations, with what general precision they were done, and all will testify to the high grade of his results. The point to which he constantly called attention was the importance of minimizing the anesthesia with reference to sparing the patients from metabolic difficulties due to taking too much anesthetic. The time has arrived to proclaim, and I think the protest should go forward in no uncertain terms, that that surgeon who consumes an unnecessary amount of time in the performance of the operation subjects his patient to an unnecessary danger. Therefore, when a surgeon begins an operation, let him begin and pay attention to his business and keep at it until the work is safely done. And this reminds me that there are other phases of the question, either actually raised or suggested by Dr. Simpson's paper—and that is as to the question of surgical competency. This is an issue that we have been dodging in one way or another for a long time. It is one that nobody likes to take up. But we all know that a lot of surgery is being done by a lot of operators who are not qualified for the work. I shudder when I think of the possible unnecessary mortality due to this cause. In one of the states, Colorado, I believe, a bill was introduced last year that was intended to put a curb on this abuse by establishing a supplementary state license on surgery. I don't know what came of the bill, but I do know that the mere fact that such a bill was framed shows that the public is taking cognizance of the fact that general medical qualification does not always imply special surgical qualification. The fact is that surgical work is being cheapened by average amphitheater exhibitions. There is too much of this thing of going for a day or a week "to see the Mayos" or "to see Murphy," or "to see Richardson," or "to see Matas," and then coming back a full-fledged surgeon. The postgraduate schools with their semi-diploma certificates are far from being without responsibility for this situation. The fact is that the "smatter-courses" ought to be suppressed. Let us get to the point of thoroughness, to the point of apprenticeship, to the point of broad fundamental culture, to the point of careful manual training, and away from the irresponsible promiscuity that now too much characterizes the surgery of this country.

DR. J. H. CARSTENS, Detroit: The patient should be carried into the operating room and anesthetized without having time to think of the operation. The shock and dread kill many patients. Another point that I wish to make is that slow operating is bad practice. No one can operate with gloves so quickly as without, so I operate with my bare hands. I see men do all kinds of operations with gloves on. These often tear during the operation and naturally will infect the patient. In order to do good rapid surgery one must have asepsis and absolutely clean hands all the time, and that means that the surgeon must not at any time put his fingers into a dirty place. If he ever gets his hands contaminated it will take many weeks to get them clean, no matter what the anti-septic or what amount of scrubbing he employs. If I make a mistake in diagnosis and find that I have a pus case I quickly put on gloves.

DR. H. J. BOLDT, New York City: Dr. Simpson said that operators should be careful to make an exact diagnosis in cases in which they intend to operate. That is very nice and while an exact diagnosis should be made in 95 per cent. we must not put the burden on the operator so much as the teachers who are connected with schools sending out men who are in time to be operators. A great many men who enter the field of surgery take a postgraduate course of six weeks or two months and go out, considering themselves specialists in certain lines of work. It is not possible that any one can learn a proper technic in so short a time. Pupils in their senior year should be taught how to make diagnoses. The method of treatment will come of its own accord if a correct diagnosis is made.

DR. C. S. BACON, Chicago: It seems to me pertinent to call attention to the proposition that a special license be required for surgical operators. Last year such a measure was presented to the legislature of Colorado, but it was not endorsed by the profession. It, however, shows the trend of the times and undoubtedly there will be a great deal more proposals of the same kind in the future. The importance of proper training in diagnosis and especially in surgical technic is admitted by all. Does every one who receives a license to practice possess such training? We all know that he does not and it is manifestly not right that every one should have the license to perform all sorts of operations.

DR. F. F. LAWRENCE, Columbus: One contributory factor in shock which has not been mentioned is unnecessary traumatism. I care not whether it be by stuffing the abdomen full of gauze or by bruising the tissues with retractors. Every surgeon should teach that such unnecessary trauma is unsurgical. What useful purpose can a lot of gauze stuffed into the abdomen serve? None. There is seldom any necessity for putting a metal retractor in the wound. If there is a bleeding

vessel down in the wound or in the pelvis or back in the mesentery it may be necessary for a moment only. When we teach that we must prevent every unnecessary trauma we will save our patients shock and forestall one of the elements of infection. There can not be infection in normal tissue.

Another thing: Operations should be done in a dry field. Sterilizing should be done the night before, a double sterilization; germs grow only in a moist soil. Ligatures should not be tied too tight. Strangulated tissue is dangerous and no matter how slight the strangulation may be it causes shock.

DR. ROBERT T. MORRIS, New York City: We are now on the verge of a fourth era of surgery. The first era was heroic. The next, anatomic. The third, now prevailing over the world, is the pathologic, in which we expect by mechanical measures to remove the causes and products of infection. The fourth era, on which we are just now entering, is the physiologic, which includes the idea of conserving all the natural resistance of the patient and allowing him to do what we have tried to do in a crude way mechanically. If we are to allow the patient to do this by conserving his self-resistance, we are to accomplish it by avoiding all the causes which shock the machine which is making phagocytes and opsonins. The patient has no other business. His business immediately after operation is manufacturing and if we interfere with the work of this machinery by long-continued operation, by long and unnecessary technic, by performing taxidermy on a patient with gauze, we prevent that patient from manufacturing his phagocytes and opsonins. An important point among those brought out by Dr. Simpson is asepsis. If I were anchoring a floating spleen I would wear a mouth mask, cap, and rubber gloves. If I were operating on a case of appendicitis with abscess, I would not wear a mouth mask, or a cap, or rubber gloves, and it would make no difference whether I washed my hands after the operation or before. If pus were spread on the normal peritoneum in the course of the operation I would leave it there. I would get in and get out. I would leave the patient with a normal resistance which would care for that pus so much better than I could care for it that his chances for recovery would be very much increased. In anchoring the spleen we might take twenty minutes for the operation; but for the pus case with appendicitis, we should not make the operation longer than five minutes if possible.

DR. HORACE G. WETHERILL, Denver: The established immunity which occurs in certain acute cases is important and frequently such patients should be tided over the acute stage. The general tendency of the last few years has been to do this with certain peritoneal infections, notably with those from appendicitis. Far too many operations have been done for acute pelvic infections and often with extremely bad results. The bill which Dr. Bacon referred to for the control of

surgical operations was presented in the legislature of the state of Colorado. It was not approved by the local medical profession. As president of the Colorado State Medical Society I presented a plan which, for us, seems much better. In the west the hospital situation is different from that of the east. We have a hospital staff; but the work in the hospital is not limited to the staff. Any physician may take his patients into the hospital and do as he pleases. My proposal was that each of the hospitals in our cities appoint a representative, these representatives to form a body to be known as a sort of hospital clearing house association representing all the hospitals in the community. Among other duties of this body every one wishing to take patients to the hospital must make application to this clearing house association. He must present his credentials, tell with whom he has worked, what his work has been, and in a broad way what his qualifications are. On such application made to this board his practice in the hospitals must depend. In many communities that is a plan which would meet this difficulty.

DR. JOHN A. MCGLINN, Philadelphia: I want to emphasize Dr. Boldt's statement in reference to diagnosis, and to urge the necessity of teaching and training students to be diagnosticians rather than operators. I feel that clinics made up of major operations are useless. The students can see but little of the technic, yet it gives them confidence to attempt work for which they are not trained. The time could be much better devoted to practical work in diagnosis. While I do not minimize the necessity of speed in operations I feel that completeness is a far more important factor. Recently I operated on a patient with double pyosalpinx several weeks after a general surgeon had removed the appendix. Within the past year a colleague operated on a patient with ruptured tubal pregnancy ten days after a very able surgeon had removed the appendix. These two cases are sufficient I think to prove the necessity of sacrificing speed to thoroughness in our work. The matter of anesthesia is important. I do not believe that it is advisable to allow the resident physician or an untrained man to give an anesthetic. I have always looked on the giving of an anesthetic as important as the operation itself. For this reason I have always employed a trained anesthetist. With reference to asepsis, I feel that the fewer assistants one has the better will be his results in an aseptic field. I use but one assistant for all operations and he has very little to do. He is simply used as an extra pair of hands to hold some instrument such as a retractor. One can train himself to work rapidly with few assistants, depending on himself for almost everything.

DR. F. F. SIMPSON, Pittsburg, Pa.: My object in bringing this subject before the Section was to get just what we have had, a definite expression of opinion by operators. Relative to

some of the factors concerned in the reduction of mortality I would say that the synopsis that I have read is merely an abstract of my paper which will be published in full and a good many of the points brought out by the discussion have been more fully dealt with than the abstract indicates.

In regard to the reduction of mortality as related to the anesthetic, the opinion I wished to convey was that a study of the deaths during the last four or five years would show that probably one-third of the deaths could be attributed directly to the anesthetic, that is, to the effect of the anesthesia in disturbing metabolism, and its influence on the kidneys and on the liver. The more fully we study the subject of acetone bodies and the effects of metabolic disturbance the more do I believe that the anesthetic and its effect on metabolism will probably be found to be the cause of a high percentage of the deaths that actually occur.