

A CONSIDERATION OF THE FACTORS WHICH HAVE  
LOWERED THE OPERATIVE MORTALITY  
AND HAVE IMPROVED THE POST-  
OPERATIVE RESULTS.

BY  
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THE deductions which are embodied in this paper, and are based on my own personal experience, are by no means new or startling; but some of them are perhaps not recognized by some of our surgeons to their full importance and they will, therefore, bear a free discussion by such an experienced body of men as are assembled at this meeting. They are of entirely practical nature and will be given without entering into any theoretical argumentation.

To emphasize some of the points which I wish to bring out more particularly, it was thought advisable to give some statistical figures, especially regarding mortality, of my own work in pelvic surgery done during the last twelve years; it is unnecessary for this purpose to reach back beyond this time, as we would then get into a period when abdominal surgery had not reached its stage of full development.

All cases requiring abdominal section for some pelvic lesion in my service at Mercy Hospital during this period, that is, from 1894 to 1906, are herein recorded, and also the comparatively few operated on outside of this institution during the last two years. All these operations were performed either by myself or my assistant. As the field of abdominal surgery is a large one and necessarily greatly diversified, it was thought preferable to confine myself to abdominal operations for pathological conditions in the pelvic organs, particularly as my experience is more closely identified with this, that is, gynecological, line of work than that which might, in contradistinction, be termed general abdominal surgery. The cases are taken from the Mercy Hospital report, carefully compiled by an especially-appointed registrar and published bi-annually; they are, there-

fore, presented in series of two years, excepting those from 1896 to 1899, which form only one report. The work during the last two years, of which no report has as yet been made, has been especially looked up and classified for this purpose. The cases from 1894 to 1904, covering a period of ten years, merely serve the purpose of showing the operative mortality in each series for the sake of comparison, while the last series, from September 1, 1904, to August 15, of this year, will be utilized more in detail in the discussion of the various points brought out in this paper.

From October, 1894, to October, 1896, there were recorded 213 abdominal sections, with 20 deaths, or a mortality of 9.39 per cent. ( $9\frac{1}{2}\%$  +). From October, 1896, to October, 1899 (three years), 403 abdominal sections, with 30 deaths, or 7.44 per cent. ( $7\frac{1}{2}\%$ ).

From October, 1899, to October, 1900 (one year only), 165 abdominal sections, with 15 deaths, or 9 per cent. The average mortality during the first series of six years was, therefore,  $8\frac{1}{2}$  per cent.

From October, 1900, to October, 1902, 392 laparotomies were reported, with 11 deaths, or 2.8 per cent. From October, 1902, to October, 1904, 480 laparotomies, with 10 deaths, or 2 per cent. +. From September, 1904, to August 15, 1906, 598 abdominal sections, with 14 deaths, or 2.34 per cent. ( $2\frac{1}{2}\%$  +).

During this second period of six years, there were, therefore, 1,470 sections, with 35 deaths, or an average mortality of 2.38 per cent. ( $2\frac{1}{2}\%$  +) as compared with an average mortality of  $8\frac{1}{2}$  per cent. in the previous series.

The difference is so striking and remarkable that the year 1900 may well be termed the beginning of a new era in our abdominal work, especially so since the result was not due to any passing streak of luck, as demonstrated by the fact that the lowered mortality rate has been maintained and even slightly improved ever since, nor can this be attributed to any change in our operative material, which has remained practically the same; it must, therefore, be due to an improvement in the treatment. In what this consisted cannot be explained in a few words, as unquestionably quite a number of factors contributed to this end. One of the most important has, no doubt, been a better aseptic technique.

Since the introduction of rubber gloves, there has been a

marked improvement in aseptic results in abdominal operations, and their use has no doubt been a decided factor in the lessened mortality. While my assistants have been wearing gloves for a number of years, beginning ten years ago with Mikulicz's linen gloves, I myself was rather slow in adopting them, as I feared that they would seriously interfere with the skilled touch so essential to the pelvic surgeon. About this time, however, viz. in the year 1900, I began the systematic use of gloves for myself also, which I have continued ever since, and which I regard as the greatest and only safeguard for the patient against infection. It has given us the means of preventing infection with absolute certainty in clean cases, as shown by the record of our last 598 cases, in which there was not a single fatal infection in clean cases.

Asepsis was now used rather than antiseptis, and all preparations were made and are still made by a nurse appointed on account of her special fitness for this work, to which she devotes herself exclusively. The technique was simplified in such a manner that as few hands as possible are required; only two assistants are used, one of whom is experienced, trained and absolutely reliable, devoting his entire time to this work. He stands opposite to the operator and also takes entire charge of the pads, for which he is held responsible. The other assistant looks after the instruments and sutures only. The nurses connected with the operating room have no direct part in the operations, and are, therefore, not required to sterilize their hands.

Another factor of no less importance, was a more careful diagnosis and better preparatory treatment, especially in inflammatory and septic cases. While heretofore many cases of this character were operated on soon after their admission to the hospital, in the presence of a daily temperature, or at least soon after it became normal, no inflammatory cases are now operated on until at least three weeks of a normal temperature have been reached. This plan is not always easy to carry out, as the patients usually feel so well by that time that they are difficult to persuade of the necessity of an operation; others become so impatient during the weeks of suspense at the hospital, that it takes the greatest amount of tact and persuasion to keep them in the hospital until their condition warrants operation. But I am convinced that many lives are constantly sacrificed by the too-early operation after an

attack of acute pelvic peritonitis, and the longer an operation can be deferred after the inflammatory symptoms have subsided, the less we need fear a stirring up to renewed activity of the dormant pyogenic organisms, resulting, if not in a fatal septic peritonitis, at least in wound infection and more or less serious complications. In spite of all these precautions, six of the fourteen deaths in the last series of five hundred and ninety-eight operations were in just such cases from a septic peritonitis, proving the necessity of further delay in many of these cases.

A factor which perhaps does not receive the attention it deserves, in my opinion, is the advisability of doing your operative work as much as possible in one institution, in which you are master of your operating room, and have complete control of the personnel in charge, who will conscientiously carry out your technic in its minutest detail.

This arrangement centralizes the work for the operator who can devote more personal attention to his cases and supervise the after-treatment. He also keeps in better touch with the nurses under him, whom he can teach and instruct personally in matters most important for them to know. I believe it is to this centralization and personal supervision that the Mayos owe much of their success.

I am sure that it is largely due to this factor that I have been able to save the last four cases of intraperitoneal hemorrhage following abdominal sections. Had they been less favorably located and under less watchful care, their lives would no doubt have been sacrificed. There are other post-operative complications in which relief depends on prompt recognition and action, which is only possible when the cases are under your personal supervision, or that of an experienced assistant, trained in this line of work. It requires no little courage at times to carry out this centralization idea, because it is opposed not only by some of the patients, but what is more serious, by many of the physicians on whose patronage the operator depends, to a great extent. The patient can generally be won over by a clear statement of the advantages gained; but the physician whose motives are not always pure and unselfish is less open to persuasion. If you must operate outside of your own hospital, it should be done only with your own assistants, for reasons unnecessary to detail. One good trained assistant is an invaluable aid in an abdominal opera-

tion, and his services should be dispensed with only in emergency work when not within reach.

Another reason for our better results, was no doubt a more careful operation and better protection of the abdominal contents. The intestines in all abdominal operations are carefully packed away from the pelvis and covered with pads, so that they are usually neither seen nor touched during the active part of the operation; they are also protected from septic material, if such be in the pelvis. All raw surfaces are thoroughly and carefully covered up with peritoneal tissue, whenever such a course is feasible, and it usually is; this not only checks up all oozing, but also prevents adhesions and other undesirable complications. While we use drainage in some cases, especially septic cases, we do not let it take the place of a complete and thorough operation, and especially a restoration of the normal peritoneal coverings where such have been lost or displaced during the enucleation of the diseased structures. Such careful plastic work, as it might be termed, in the abdominal cavity, takes time and patience, and the surgeon, therefore, should never be hurried and too fatigued. We should, therefore, never operate on too many cases at one time. Two bad cases in one morning are quite sufficient, and it is generally advisable to interpose some lighter work, such as plastic operations, which give the surgeon time to rest and to recover from the strain of the previous work. Instead of crowding my work together into a few operating days, as I formerly did, I operate every day, preferably in the morning, when rested and fresh, and when the patient also is best prepared for the ordeal.

In addition to the six deaths from septic peritonitis in the last series of five hundred and ninety-eight cases already mentioned, there were two others from septic peritonitis: one was an infected ectopic gestation, with extensive bowel involvement, and the other a case of cancer of the body of the uterus, far advanced, in which the vaginal route had to be abandoned for the abdominal, on account of the friability of the uterus. This case was also complicated by a nephritis previous to operation. There was not a single case of septic peritonitis following operation in cases not previously infected.

Of the remaining six fatal cases in this series, there were three sudden deaths from embolism, two pulmonary—an unusually large percentage in our experience—two from shock

and hemorrhage within three or four hours after operation; one an intraligamentous suppurating ovarian cyst, the other a very difficult intraligamentous fibroid; this being the only death in the one hundred and eighteen cases of uterine fibroid operated on in this series. A case of chorion-epithelioma and dermoid complicating pregnancy of four and one-half months died on the twenty-third day after operation, from rapid extension and metastasis.

Of the complications occurring, I may mention four cases of fecal fistula, all of which, however, closed spontaneously before leaving the hospital, excepting one case of tubercular salpingitis and peritonitis. In addition to these, there were three cases of extensive suppuration of the abdominal walls, and fifteen cases of slighter wound infection. With the exception of the tubercular case, there was only one case leaving the hospital with an abdominal fistula, a pelvic suppuration case. In this list are, of course, not included a number of slight, superficial skin irritations and infections, which healed up in a couple of days. We had, therefore, twenty-two cases of more or less serious wound infections, or  $3\frac{3}{4}$  per cent., which goes to show that in spite of the greatest care in the preparation of the abdominal skin, we have failed in a number of cases to obtain a sterile operative field, a result not surprising, when we consider the difficult problem of skin disinfection.

By the use of catgut as the exclusive ligature and suture material in the abdominal cavity, except in intestinal surgery, the long tedious suppurating sinuses, so common in former days, have almost entirely become a thing of the past, as shown by the fact that we have had only one such case in almost six hundred sections. It has also practically done away with the stump exudates, which were so annoying to the patient and surgeon alike, when silk was used in the abdomen, often leaving the patient in as bad, if not a worse, condition than before the operation. The use of catgut must, therefore, be regarded as a great advance in abdominal surgery, especially so since we have learned to prepare it properly. This preparation should, whenever possible, be done under personal supervision instead of leaving it to outside parties.

Another factor which has added very much to the safety and comfort of the patient, is the employment of a special competent anesthetist, whose sole duty is to administer the anesthetic, and who thereby becomes remarkably skillful and

expert in this line of work. Not only are renal complications rarely observed now, but also protracted nausea and vomiting have become very exceptional, and the convalescence of the patient has been rendered very much smoother and pleasanter in every respect. Only those who have been fortunate enough to have such a specialist in the administration of anesthesia can fully realize the importance of such an adjunct to the operating corps.

In summing up the causes to which we attribute our better results, both in regard to operative mortality as well as post-operative morbidity, are:

1st. A more simple and better aseptic technic, including the wearing of rubber gloves for all hands concerned in the operation.

2d. Better diagnosis and more careful preparation of the patient, especially the acute inflammatory cases, whose abdominal section is delayed at least three weeks after subsidence of all acute symptoms.

3d. The employment of a trained, absolutely reliable first assistant.

4th. Centralization of all operative work, enabling the operator to give the greatest amount of personal attention to his patients.

5th. The careful closure and covering of all raw surfaces in the peritoneal cavity.

6th. The exclusive use of catgut prepared under personal supervision.

7th. A trained anesthetist, who administers a minimum amount of anesthetic consistent with good work.

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## DISCUSSION.

DR. HERMAN E. HAYD, Buffalo.—This is a very interesting paper, because it shows the gradual development and evolution of a surgeon. As surgeons we do unintentional mischief, yet we have the satisfaction of knowing that we accomplish a great deal of good, because we profit by our mistakes and we fortify our work by getting just such statistics as Dr. Werder has brought here to-day—namely, in reducing the mortality from eight per cent. to two in this complicated class of cases. He has also shown that he is a progressive and scientific man; that he has improved his technic; that he has added to his system of operating every-

thing that offered advantages in his work. Nevertheless, to a practical man, the question often arises whether it is not possible for us to be doing too much in carrying out this beautiful scientific technic. I think we are all getting too much afraid of germs; that we are all talking a little too much about them, and in our anxiety to perfect a technic we become careless over bigger things and leave some of the grosser lesions unattended.

There is no question that gloves are a great aid in our operative work. I use them a great deal, but there is a tendency on the part of many surgeons to use them too much. Dr. Morris has used gloves in his operative work, and I think in this discussion he will tell us that he has practically discarded their use. However, he makes his assistants and nurses wear them. But to do rapid surgical work and save life he will tell us that he can do better without gloves. No doubt one can develop tactile sensibility in time, so that he can do good work with gloves. He can do better work, however, with his fingers than he can when they are covered with gloves. Do not let me leave the impression that I never use gloves, because I do in my hernia and Alexander operations, and whenever delicate tactile sense is not required.

Dr. Werder has told us that he believes his mortality would have been reduced in the acute cases if he had kept on treating them for two weeks longer. I don't believe we should permit our patients to lie in bed for three weeks with a temperature when, in all probability, that temperature is due to a collection of pus. If it were possible for us to make an absolute diagnosis, then I can imagine it would likewise be well for us sometimes to wait. But since we all have our limitations, and since usually the signal for interference is elevation of temperature, it is a question in my mind whether to-day we should accept Dr. Werder's conclusions, and particularly after listening to what Dr. Morris and Dr. Murphy told us yesterday about diffuse peritonitis. I really feel just as Dr. Price said with reference to the use of cathartics that many of these patients with acute suffering, who come to a dispensary, are physicked thoroughly and are made temporarily comfortable then and delay their operations; yet delayed operations in these cases not only increase the complications, but the mortality, and Dr. Werder, one of the very best surgeons we have in this Association, comes to us and tells us to delay. I do not believe that his splendid statistics are the outcome of delay in these acute cases, but to experience and judgment as an operator. I believe he should have operated on them at once, and not have waited three weeks, and his results would be as good if not better.

DR. JAMES N. WEST, New York.—Perhaps the modesty of Dr. Werder is responsible for his having omitted one element which undoubtedly has considerable influence in his results of to-day, and he naturally, as we all do, turns back the leaves of his history

book and sees the results he had ten years ago and compares them with the results he obtains to-day. He has given us a beautiful recantulation of many of those elements that make for success of operations to-day and that have so much decreased the death rate. But one of the most important elements he has not mentioned, and that is the personal element that goes on in every man's life until he reaches a time when the brain begins to fag and the hand begins to tremble and fails to perform the action which the brain tells it to do. If we are progressive men, as we go along from week to week, from month to month, we will improve in our technic and in the rapidity of operations; and in proportion as we improve in our operative work and in our asepsis, so will our patients get well more rapidly and we will diminish the death rate. The element of time comes in here, and, of course, that brings in the element of shock, and in this way our death rates are reduced through the increase of speed and perfection of technic.

For four years I have been teaching operative gynecology upon the living subject at the Post-Graduate Medical School in New York. The faculty management gives me the opportunity of selecting the men I wish to take into this class, and I believe that the effort to try to tell men when they should make haste, what points to take care of, so that the work is done nicely and exactly, has been of more aid to me than any other work in my life. Some of these men will take so much care in tying a knot that they will lose valuable time about a little detail that is entirely unnecessary. When a man has acquired the ability to know when he can hurry, and when he has learned how to do it, and when to be careful and knows how to do it, he is a genius.

DR. EDWARD J. ILL, Newark.—I congratulate Dr. Werder on the excellence of his paper. We have had the pleasure of listening to a paper which has not dealt with generalities, but facts. The author has made some fundamental changes in his operative technic; he has mentioned them, and by their means he has been enabled to lower his mortality rate very materially. From what he has said we can tell how exact he is with his asepsis. Go through the country and stop at the operating theaters and notice the difference of asepsis as carried out by different operators. Watch the nurses and see all the breaks.

Dr. Werder has only one nurse and one assistant who carry out the details of asepsis and other work in accordance with his directions. He has given us his work from year to year and his results, and his paper is one from which we can learn a great deal. I am sure, when this paper is published, we shall read it carefully and study the methods by which he has obtained such excellent results.

DR. JOSEPH PRICE, Philadelphia.—It pleases us to see what others are doing and how they are doing it. It is not fair to

say that Dr. Werder does not change his methods and improve them. We make our observations and studies in the operating room, and then bring the results of our work here for discussion.

The Germans have not adopted the use of gloves in their operative work. We have received from Germany much that has improved our work, and when I make that allusion I am going to begin with a reference to the morning work of Dr. Werder. He is a scientific man, with a scientific training, and has presented his work in a classical way, so that we cannot help, as practical men, but value a contribution of this character. We know what we are going to get when a paper comes from Dr. Werder. As I have remarked, the Germans do not use rubber gloves. That is a source of comfort to me because I have not been using them myself, and it has afforded much harsh and unprofessional criticism fired at men who slowly adopt something new, but who continue to practise their old methods. Dr. Werder's mortality has been reduced very materially by the methods he has carried out. I do not believe there is the six-hundredth of one per cent. between my mortality and that of my scientific friend.

Let me allude to the early morning work of the Germans. Martin, Olshausen, and others, past-masters in our specialty, take their evening bath and toilet as a preparation for what they are going to do to-morrow morning. Early in the history of this work, as reported by Munde, the mortality of some of the best morning operators was reduced to two per cent. While this was going on the mortality following Tait's morning work was 3.5 per cent., and in the afternoon 8.5 per cent. It is said that Bantock, at the Samaritan Hospital, doing his operative work in the morning, performed ninety ovariectomies without a death, while Thornton and others who operated in the afternoon had a mortality of 11 per cent. Were I the director of a hospital I should compel surgeons to do early morning work, but would pay them a salary for the sacrifice they would make to do this work. It is not fair to ask surgeons to go to a hospital, to bathe, scrub, and clean themselves, free from fatigue and anxiety, and expect them to do their morning's work without proper compensation. My mortality away from home from afternoon operations is above that following the morning work at home—always. There are several reasons for this which I will not stop to mention.

In regard to nurses. Some of you doubtless remember a Boston gentleman who criticised the training of American nurses that in the Continental hospitals a nurse spent her life in the operating room. That is scarcely fair to the training schools for nurses. The man who trains nurses, who trains assistants, or tries to make operators, will always have a fraction of mortality above that of his brother surgeon who holds on to the

operating staff. I value highly the services of good nurses, particularly those whom we can entrust to go to a place and get an operating room ready for us to operate in four hours. As a rule, such nurses only come from private hospitals. The average nurse in the country, at the cross roads, and remote points from general hospitals is worthless. Reference has been made to the importance of diagnosis. We cannot emphasize that phase of the subject too strongly.

As to methods, I have made many departures. I am constantly changing my ways for specific purposes. For instance, I have adopted this plan in our system of nursing: I do not want a young woman to study nursing who does not know how to behave; who does not know how to live a clean, moral, upright life. I have adopted in our system that of the University of Pennsylvania. If a boy can behave himself at the University of Pennsylvania and graduate with honors, I do not see any reason why a young woman cannot graduate from a hospital as a good, refined nurse. It is a trial trip, you understand.

As I said just now, I am changing my ways. I have ceased to examine patients when I am called to see them by good practitioners. I want to whip practitioners up to make accurate diagnoses. You have heard me say repeatedly that I have crossed the Alleghenies one hundred times to find practitioners correct in their diagnoses. A practitioner telegraphs me, for instance, that he has a case of ectopic pregnancy in which rupture has taken place, and on my arrival I find the abdomen full of blood, showing that the diagnosis was accurately made. I operate in some six to ten hospitals around Philadelphia, being informed in advance as to the nature of the case or cases I am expected to operate on, and if I examine those patients at all, it is simply to get a clear mental picture of what I am going to do. I try to educate myself to that degree of refinement in diagnosis, but some of you will say that it is not safe practice to entrust other practitioners to make diagnoses for me. Whenever possible, however, I want these doctors to make their own diagnoses. That is one reason. Another is that I do not want to soil my hands before going into the peritoneal cavity. It would take much longer to wash them, and I would not be able to do as clean work as I should do.

I am satisfied that Dr. Werder is wrong in counseling delay in the class of cases under discussion. We have been over that ground again and again, and we have fought against delay in operating severely. I do not believe it is right to permit a man's house or barn to burn down before we call in the fire department. Let me cite three terrible cases.

While attending a meeting of the Tri-State Medical Society at Spartanburg, S. C., I was asked to see a little boy who was very sick. His abdomen was opened at two points. He had "busted," in common parlance; feces and urine were welling up

from the abdomen. This case made me feel ashamed of my profession. It shows the great danger of delayed operations.

A few days later I operated on a case of intestinal obstruction. I opened the abdomen, freed the guy-ropes and bands, and in this case, as in the other, found feces and urine welling up from the abdominal cavity.

A little girl was brought to me with pus and feces welling out of a hole in the abdomen. I had practised surgery for more than a quarter of a century and felt I had something new to deal with. These cases were new experiences to me, and I can assure you that if I had my choice, rather than to have dealt with them, I would have preferred to spend a week in the county jail. Now, that is just what some of Dr. Werder's cases will come to with this long, scientific preparation.

Dr. Murphy cited thirty-six cases of diffuse peritonitis without a death. He has shown us what can be accomplished by going to the limits of the pathology and inserting one or more drainage tubes.

I saw another patient ready to "bust" open the other day. I was asked to go to Keytesville to see a woman on whom criminal abortion had been attempted with a crochet needle, the needle having perforated the uterus. The doctor said he had cleansed the uterus, and had gone to Bedford to attend a meeting of a State medical society. When he came back he telegraphed and asked me if I would see the patient with him, as her condition was desperate. Her abdomen was enormously distended, and her whole condition rather alarming. The uterus was down under the pubic arch, so that I could scarcely introduce my finger into the vagina. There was considerable pus present. All of these cases illustrate in a striking way the dangers of delayed operations.

DR. S. STARK, Cincinnati.—I have been very much interested in this paper. The practice of Dr. Werder is in conformity with the pathological conditions found in old cases of pus tubes, abscessed ovaries, and the like. We know that during the period of active development of salpingitis and ovarian inflammation the germs are multiplying rapidly. Furthermore, we know that if a sufficient length of time is given for these inflammations to subside, the germs die within their own toxins. I do not remember the exact statistics as given by various pathologists and operators, but I believe that not more than possibly 4 per cent. of old pus tubes and abscess of the ovaries present germs. They are nearly all sterile; consequently late operation would be in line with the pathological findings.

As to the gravity or danger of allowing these cases to go on, I have seen many cases of pelvic inflammation the result of gonorrhoeal infection of the tubes and ovaries, but have never seen a patient die in consequence of a general diffuse septic

peritonitis developing from a pelvic infection. This infection remains local, and stress was laid on this by Dr. Murphy in his paper yesterday, when he said that the lower abdomen behaves entirely different from the upper abdominal zone in this respect. Our line of treatment, therefore, in infections of the lower abdominal cavity should be different from what it is above. The few patients I have lost, after abdominal section for pus tubes and abscess of the ovaries, were cases in which there was an active virulent condition of the pus. In the old cases, if the tubes rupture, or if we have an abscess of the ovary rupture, we can close up the abdomen without any drainage, without fear. I do that continually and have absolutely no trouble. The patients invariably get well. I had hoped some of my associates here in the city would say something on this subject, for the reason that I know they take the same position that I do in this matter. I know it is the routine practice at the City Hospital for the staff to wait in these cases until the acute pelvic inflammation has subsided before they perform the operation of salpingo-oophorectomy. This is what, I believe, Dr. Werder referred to in particular, for the reason that at such a time the virulence of the pus has subsided. I am satisfied that if the high temperature, if the general peritoneal inflammation persists too long, unreasonably long, Dr. Werder would not wait. He would wait for three or four weeks, the usual time for the inflammation to subside; but if it continued for five or six weeks, he would operate.

With regard to the use of gloves, I wish to say that operating as I do at the City and Jewish hospitals I have been employing two different methods. At the City Hospital I operate without gloves and without mask; and at the Jewish Hospital I have been operating with the mask and with gloves. My results at the City Hospital are just as good as those obtained at the Jewish Hospital. For the reason that my tactile sense without gloves is more acute. I am beginning to abandon the use of gloves in operating. The rubber glove is a menace. It has been shown that under the influence of the additional heat that is produced by the wearing of the rubber glove, the staphylococcus, whose normal habitat is in the skin, is stimulated to multiply in short order, and likewise those germs which we cannot get rid of under the finger-nails or matrix even by thorough scrubbing. Wearing of the rubber glove is a menace, and its use ought to be discarded.

DR. O. H. ELBRECHT, Saint Louis.—I would like to ask Dr. Stark whether any actual analyses have been made of the cases of pelvis or ovarian abscesses and pus tubes, which he said contained about 4 per cent. bacteria.

DR. STARK.—I stated that I could not recall the exact statistics, but the figures I have mentioned are the figures given by

Kelly and others which I had in mind when I spoke of Kelly's report of ninety odd cases of tubal abscess in which only 4 per cent. of germs were found present. In ninety-six odd cases only 2 per cent. of germs were found.

DR. ELBRECHT.—I think the percentage of germs found in these abscesses is much higher than that mentioned by Dr. Stark. This is practically true when the streptococcus is concerned. It is our practice to make a culture and a cover-glass smear of any pus that comes from the abdominal cavity, to find out what it is and to ascertain, if possible, an approximate percentage of the cases that contain bacteria. We have done this in perhaps 200 cases and we have found that the percentage of germs in such pus is greater than that quoted by Dr. Stark.

If you will take the trouble to get enough material for culture, say 10 drops or more, and grow it in bouillon on agar of blood serum and give it plenty of time to grow, you will find a much larger percentage of streptococci in your cases than you have heretofore. If you only wait twenty-four to thirty-six hours for them to grow, you will not find them, for if you have had any experience in growing streptococci on artificial media, you must know that they grow slowly. This is the usual mistake that is made in the technic and that is one reason why streptococci are not found oftener than they are. We find as high a percentage of streptococci in cases of pus tubes as we do staphylococci, which occur in low percentages. Gonococci, which are the most common causative factor of pus tubes, are seldom found because the pus is diluted. In acute cases you may find them, but in the old cases you will find usually sterile pus, and the reason we call it sterile is not because the bacteria are not there, but because they are scattered too much and can but seldom be grown successfully on an artificial media, and this includes also the medias that are especially prepared for gonococci. With regard to the use of rubber gloves, an important point is to prevent the escape from the glove of the macerated extractions of the upper layers of the skin. If you keep on rubber gloves for a considerable time, in operating, sweating and maceration of the skin occur under them, this being especially so in warm weather. If you hold your hand up, the liquids run out of the glove on your arm and one of your assistants or an instrument may touch your arm at just that point, and in this way infectious material can be carried into the wound. The juice and extractives that come from having macerated the finger-nails under the rubber glove is always dangerous. This can easily be prevented, if you will wrap two layers of gauze around the wrist as a cuff under the gauntlet of the glove. It will absorb this juice as it starts to run out of the glove and the arm will remain perfectly dry. This is a routine practice for us, for I feel that it helps a great deal toward preventing accidental infection, and if you will

take careful notice of this fact, you will be impressed by the frequency of this little accident.

DR. WERDER (closing the discussion).—I wish to refer to several points that have been mentioned in the discussion, one of which relates to the use of rubber gloves. Now, I had the same scruples about the use of gloves that some of the gentlemen have mentioned. At first I had considerable difficulty to accustom myself to them and they seriously interfered with my sense of touch. It happened several times in bad cases of pyosalpinx, for instance, which required very skilful work in the pelvis, that I was compelled to remove the gloves before I could finish the operation, and that is a somewhat dangerous thing to do. But a little practice and experience soon overcame these difficulties and at the present time I can do operative work just as well with gloves as I formerly did without them. No doubt all surgeons have similar experiences at first, but in time they learn to work with them just as skilfully and rapidly as without them.

I think the point mentioned by Dr. Elbrecht in regard to dripings from the gloves is a very good one, and that has induced me to use sleeves for the last three or four years. These are tightened around the arm so that any fluid escaping from the glove is caught by the sleeve and does not reach the operative field.

In regard to operating on acute cases, I think that question has been answered by Dr. Stark in a very thorough manner. There is a marked difference between an infection and suppuration in the pelvis and that condition in the abdomen. No one would think of delaying operative interference in a case of appendicitis for three weeks or longer, because that would be seriously jeopardizing the patient's life every day. Deaths from pelvic suppuration *per se* are rare, however, especially when kept under constant observation. In these cases the acute symptoms subside; the patients recover and generally remain well for several months, when they may have another attack. If we operate on these cases it is because it is the only way to cure them of their chronic invalidism and not so much because their lives are in imminent peril. Delay in these cases is usually safe provided we have the patient under our own care in the hospital. I recall a number of deaths which I feel confident were due to too much haste in operating; the operations being done against my better judgment, giving way to the clamors of patient and friends. It is not pleasant to tell patients every day that they must have a little patience; that they will be operated on in a week or in two weeks. At the same time it is the only way to save life in some of these cases. You see on the walls here displayed charts giving you the statistics of abdominal operations performed by an excellent surgeon whose results are certainly most creditable to him. But look at his mortality in operations for pelvic infec-

tions and abscesses—20 per cent. mortality; pelvic peritonitis, 18 per cent. mortality; pyosalpinx, 5 per cent. mortality. This high mortality is certainly not due to any lack of skill or care because his results in other lines of abdominal surgery are most excellent. It is not because he is not a skilful operator, but because he, no doubt, operates during acute attacks just as he does in appendicitis. Had he waited three weeks or longer after the subsidence of the acute symptoms, he would not have had such a high mortality. My experience in the past has shown us that it is far safer to wait during the acute attack than to operate. If surgeons in general would appreciate that fact in cases of pyosalpinx or of pelvic peritonitis a mortality as high as 14 and 20 per cent. would be unknown, and many such patients could be saved that now are sacrificed to too hasty operations. We rarely have a death from pelvic peritonitis, but if the case is so bad as to show no evidence of improvement after a reasonable time, and there is a large collection of pus in the pelvis, we are justified in such a case in resorting to vaginal incision and drainage. While this as a rule is poor surgery, there are exceptional cases in which this procedure becomes a life-saving one, as it tides the patient over this dangerous period and puts her in a more favorable condition for a radical operation subsequently, if such be necessary.

It has been said that speed is a factor of some importance in operating, and I fully agree with what has been said in regard to that point. It is not so important, however, when you have a good anesthetist. It makes a very great difference as to the amount of ether your patient is given. It is the amount of anesthetic used, oftener than speed, that has a marked influence on our results.

I agree with Dr. Price when he says that it is our duty not only to save life, but to train nurses so that they may go out and be a help to us beyond the hospital. This I try to do largely through my operating room nurse, who is quite expert in her work, does nothing else but attend to the operating room, and who has two nurses under her in training for a period of two months, during which time they acquire a pretty thorough knowledge of surgical technic.