well four months to two and a half years after the operation.

From the above results it would seem quite evident that the clinical course of the disease has very little relation if any to the number of actively multiplying cells in a given specimen of neoplasm.

It is clear then that it is not wise for the pathologist to attempt to make any prognosis concerning the duration of the life of the patient by drawing conclusions from his microscopic examination. It also would seem advisable not even to suggest that the tumor is apparently taking on a rapid growth, as that could easily give the clinician an incorrect idea.

The accompanying table gives a summary of the cases from which the conclusions are drawn.

410 North Jefferson Avenue.

THE VAGINAL, THE VERTICAL-ABDOMINAL, AND THE PFANNENSTIEL INCISIONS.

THREE PROCEDURES FOR ENTERING THE PELVIC AND AB-
DOMINAL CAVITIES.*

E. E. MONTGOMERY, M.D.

Professor of Gynecology in Jefferson Medical College.
PHILADELPHIA.

Many and spirited have been the discussions over the relative merits and demerits of the vaginal and abdominal routes in the practice of pelvic surgery. In discussing them and the additional procedures, I shall endeavor to do so, not as a partisan, but with the sole purpose of making evident the conditions under which they may become useful, where one may be preferable, and thus enrich the resources of the conscientious investigator in this realm.

VAGINAL ROUTE.

Subsequent to, in many cases prior to infection, the tubes and ovaries not unfrequently drop into the retro-uterine pouch. The infection drains into this most dependent portion and forms a large collection varying between dirty serum and foul acrid pus, according to the character and virulence of the infection. Such a collection is walled off from the general peritoneal cavity by a mass of exudate,—Nature's barrier against the spread of infection. Incision through the posterior vaginal fornix, in such conditions, ensures the evacuation of the accumulation without danger of soiling the peritoneum. Independent tubal or ovarian abscesses can be opened into and drained without the spread of the infection. Under such circumstances, does it not seem the height of folly to attack such a collection from above?

Certain considerations are of importance in determining the selection of the vaginal route. The vagina must be dilated, or readily dilatable, hence the procedure should not be advised in a virgin or nulliparous woman with a small vagina. The collection, whether serum, pus or blood, must be situated in the retro-uterine pouch or be readily accessible through it. Collections in a single tube or a suppurating ovary situated above the superior strait are preferably treated by abdominal section. In the large majority of cases, the vaginal section should be made through the posterior fornix, for the reason that this is the most dependent

portion of the peritoneum and drainage is most effectually accomplished. Access is here most readily afforded, as the tissue through which the incision is made is but a quarter of an inch in thickness.

Large collections of pus, however, will frequently necessitate an anterior colpotomy as well, in order to afford vent to accumulations in front of the uterus and the broad ligaments. The anterior incision facilitates the investigation and treatment of perisalpingitis and perioophoritis, when the affected structures are fixed in or near their normal situation. I would, then, advise vaginal incision for retro-uterine collections as a procedure which will render an abdominal incision at the same, or a subsequent date, less grave and may frequently make it unnecessary.

The vaginal route is of especial value in exploring and treating diseases of the tubes and ovaries, and particularly in obscure cases in determining the existence of ruptured ectopic gestation. Some forms of malignant disease of the uterus, some uteri containing small fibroids and occasionally inflammatory conditions of the appendages which justify hysterectomy are best treated through the vagina, particularly when the patient has a large quantity of adipose tissue in the abdominal wall.

ADVANTAGES OF VAGINAL ROUTE.

The vaginal route has the following advantages:

1. Drainage is from the most dependent portion of the peritoneal cavity.
2. In a fair proportion of cases, it permits the cure of the patient by a less radical procedure.
3. In a fair proportion of cases, it permits the cure of the patient by a less radical procedure.
3. The convalescence of the patient, even after a hysterectomy, is more rapid and attended with less discomfort than is associated with the same procedure through the abdomen.
4. The restoration to health is expedited, and the patient is spared such sequelæ as ventral hernia and ventral adhesions.
5. In many cases, it permits the peritoneum to be closed over the vagina, the stumps of the broad ligaments being brought out so that all ligatures and raw surfaces are excluded from the peritoneal cavity, leaving opportunity for the formation of adhesions. The latter statement can not, of course, apply where extensive inflammatory collections and adhesions have existed previous to operation. In such cases, dependence must be placed on walling off the intestines with gauze to prevent contact with the raw surfaces.

DISADVANTAGES OF VAGINAL ROUTE.

The vaginal route has, as its opponents indicate, the following disadvantages:

1. The procedure necessarily must be, in many cases, a blind one, as extensive adhesions must be separated by touch.
2. Injuries to the intestines or previously existing intestinal sinuses are likely to be overlooked, fecal fistula may form and imperil life, or destroy the health and comfort of the patient.
3. Extensive adhesions of the intestines are unrecognized, or form subsequent to the operation, and lead to obstruction and consequent disaster. The initial adhesion need only be a small one on the outer margin of the coil of gut to become a serious menace. With this adhesion as a fixed point, peristalsis may lead to twisting of the loop and result in obstruction. An ob-

* Read in the Section on Obstetrics and Diseases of Women of the American Medical Association, at the Fifty-ninth Annual Session, held at Chicago, June, 1908.

struction may exist which other peristaltic movements may undo, producing symptoms of intermittent obstruction, or the torsion may become aggravated.

ABDOMINAL ROUTE.

The abdominal incision in the median line is without doubt the procedure capable of the widest application. It affords ready access to the pelvis, and when required may be so extended as to permit the inspection and manipulation of the contents of the entire abdominal cavity.

Through this incision every stage of an intricate and prolonged operation is continually under observation, ready access is afforded for manipulation, hemorrhage can easily be controlled, and injuries to important viscera recognized and repaired. Operation through this incision is by no means a blind procedure. It is not surprising that its advocates should feel that it fulfills all the requirements and leaves nothing to be desired.

Observation discloses, however, that the victim of an operative procedure suffers greater discomfort during convalescence than is experienced by the patient who has suffered a similar or greater deprivation of organs by the vaginal route. Nature's barriers are necessarily broken down, and both peritoneum and incision are exposed to infection. The situation of the wound is not the most favorable for drainage, as a portion of the cavity, generally that which has been subjected to the greatest injury, is below the most dependent portion of the incision. Drainage, consequently, must be against gravity. In acute infections, this defective drainage frequently compels the operator, in order to be safe, to do more than he would feel obliged to do had the vaginal route been substituted.

THE PFANNENSTIEL INCISION.

The Pfannenstiel incision, our third procedure for entrance of the abdominal cavity, is a curved incision, the convexity directed downward, just above the symphysis, passing through skin, superficial fascia and aponeurosis, exposing the pyramidalis and recti muscles. These muscles are separated from each other in the median line and the peritoneum is opened vertically. I have employed this procedure in over 200 abdominal sections and have found it especially acceptable in operations on the intrapelvic viscera. The muscle fibers being much more elastic than those of the aponeurosis permit a much more free exposure of the pelvis through a relatively small incision. In round ligament operations for retro-displacement it brings the operator directly over the ligaments he seeks.

In operations on the bladder, and in extirpation of the uterus for small growths, it is especially valuable. It is to be preferred in operations done on fleshy women, as the superficial incision can be made where there is the least deposit of adipose tissue. In closing the wound it has been my custom to close the peritoneum and muscle margins with a continuous chromic cat-gut suture drawn sufficiently tight to hold the surfaces in apposition and not constrict the muscle tissue. A second continuous suture unites the curved margins of the aponeurosis, and the third the edges of the skin. Particular care must be exercised to prevent any bleeding between the successive layers as a hematocoele may form, which, if it becomes infected, will imperil the stability of the subsequent support.

ADVANTAGES OF PROCEDURE.

The procedure, in addition to the advantages named, has the following:

1. It permits a larger exposure of the field for a comparatively small incision.
2. As the interior and middle lines of suture closing the wound are at right angles to each other, the probabilities of subsequent hernia are lessened.
3. As the incision through the skin is, under ordinary circumstances, within the portion covered by the pubic hair, with its regrowth the site of the scar is completely obscured.

DISADVANTAGES OF PROCEDURE.

Its disadvantages are as follows:

1. It is of limited application and consequently unsuitable for the removal of fibroid tumors of any size.
2. The necessarily large opening of the cellular tissue makes it undesirable for the treatment of pus collections within the pelvis, as it is difficult to preserve the wound tissues from infection.

DISCUSSION.

DR. H. J. BOLDT, New York: I take decided exception to a statement by Dr. Montgomery as to the advantage of the vaginal over the abdominal operation. Dr. Montgomery said that convalescence was more rapid by the vaginal route than by the abdominal. The only advantage that I can see in the vaginal compared with the abdominal operation is the fact that there is some risk of subsequent ventral hernia and, furthermore, that there is considerable risk of intestinal adhesions to the parietal peritoneum. These are the chief dangers of the abdominal operation. I believe that those who have followed for many years the transactions of the New York Medical Society will perhaps remember that I was one of the first advocates of the vaginal operation. In fact, I was very enthusiastic about the vaginal operation twenty years ago, and up to fifteen years ago, but gradually I have limited the field of utility of that kind of work. There is no question that vaginal operations have their place in gynecologic surgery, but the field is more limited, I believe, in the hands of experienced operators than it was formerly. I have seen the work of the best gynecologists, exponents of vaginal operations, and it has confirmed my opinion that the operation has a more limited field than formerly was thought and taught. So far as my observation goes, in pelvic inflammation when there are many adhesions, its use is more limited than the abdominal operation, the advantages of which Dr. Montgomery has held before us. When, however, there is a full, roomy vagina, and when the pathologic condition which we want to attack is in the cul-de-sac, the operation may be satisfactorily done by the vaginal route in most instances.

DR. RUFUS B. HALL, Cincinnati: I believe that the operation of vaginal section has a field, and likewise the abdominal operation. The real reason for doing a vaginal section on one patient and the abdominal section on another patient is not in order to get the patient up more quickly. Vaginal section should be done if a woman has an infection which, with operation by the abdominal route, will not be followed by the best results. Vaginal section is for temporary relief in one sense of the word. I would not carry the vaginal operation to the extent indicated in the paper. I would not limit my work by the vaginal section. In the septic cases, one does not want to give additional risk by having the pus reach the peritoneum. It is better to open the cul-de-sac and get rid of the acute infection. If the patient does not recover satisfactorily, one can do another operation later. I would not exclude the vaginal operation simply because of a narrow vagina. For the same reason, if there was infection and a large accumulation of pus, I would drain through the vagina for the temporary relief, and then when the acute infection was over I would do the other operation if necessary.

DR. GEORGE GELLHORN, St. Louis: I used to be an enthusiastic advocate of the vaginal operation. For the last three years, however, I have practiced extensively the Pfannenstiel incision, with the result that I nowadays limit the vaginal route almost entirely to those suppurating cases that require either drainage or hysterectomy. In all other cases in which the conditions are not too complicated, or in which not too much room is required, I make use of the Pfannenstiel incision, because its advantages are to me very obvious. The intestines are, in this incision, never seen during the operation. The patient is in the Trendelenburg position. The introduction of gauze pads, etc., is unnecessary and, the intestines not being interfered with, not even touched, post-operative shock is greatly diminished. The late effect of the operation is very satisfactory. The scars are strong. I know of no case of hernia after this operation. I have had two cases of hematoma due to insufficient ligation of arteries in sewing up the incision. In spite of this, infection did not occur and the scars remained solid. Two years after the operation the scars were still very strong.

A minor advantage, yet one that is to be considered, is that of the cosmetic effect. These scars are almost entirely hidden beneath the pubic hair. The Pfannenstiel incision should do away with the original Alexander operation for retroflexion. Not even the best diagnostician with the finest of touch can absolutely exclude the presence of delicate adhesions and other lesions that may cause the patient a great deal of trouble even after the retroflexion has been operated on. I can not see how one can do a shortening of the round ligament through the inguinal canal, while an absolutely safe access to the round ligaments can be had by this suprapubic incision. We must not be dogmatic and try to fit our cases to the method, instead of the method to the case, but, all things being equal, I favor the Pfannenstiel incision to enter the abdominal cavity.

DR. C. O. THIENHAUS, Milwaukee: Five years ago, before this Section of the American Medical Association, I defended the vaginal route as the best method of procedure in all cases where it is feasible. To-day I have given up much of this work and favor the abdominal route. It is beyond dispute that in cases of abscess of the cul-de-sac of Douglas or parametritic abscess, furthermore in cases of infected retrouterine hematocoele, the vaginal incision and vaginal drainage is the method and the only method of procedure. In cases of fibroid in the uterus up to the size of a child's head I was, up to five years ago, a strong advocate of the so-called *morcellement vaginal*. To-day I prefer abdominal hysteromyomectomy with retroperitoneal treatment of the stump or abdominal hysteromyomectomy according to Doyen's method. Two peculiar accidents, which I have not often found mentioned in gynecologic literature, have induced me to make this change. I operated in two cases of fibroid which had been subjected to treatment by electricity previous to the operation. During the *morcellement* of these fibroids by the vaginal route two small pus cavities lying intramurally in the wall of the uterus were opened and both patients died from a virulent septic infection, the source of which undoubtedly must be attributed to these intramural pus accumulations. It is my firm conviction that abdominal hysteromyomectomy would have avoided this accident and would have saved the lives of these patients. In cases of chronic adnexitis I was five years ago a great friend and strong defender of the so-called *castration vaginale générale* according to the method of Schauta (Vienna). To-day I prefer by far the abdominal hysteromyomectomy. The reasons for this change are twofold: First, it is a well-established fact that in many cases of chronic adnexitis the appendix is adherent to the female pelvic organs, or even involved in the inflammatory process, and, as under such circumstances the appendix ought absolutely to be removed at the same time, abdominal section is by far preferable. Second, in cases of adnexitis on the left side oftentimes the sigmoid flexure is involved or even the primary seat of disease and needs surgical attention, and this can be given properly only by the abdominal route.

DR. CHARLES BETTS, Toledo: My choice of the abdominal

or vaginal route would depend on whether the patient seriously objected to the scar or not. So far as the dangers to hernia are concerned, it makes little difference whether the incision is made according to the Pfannenstiel method or in the median line. The whole thing in a nutshell is how the structures are put together. So far as the peritoneum is concerned, I do not think that it cuts any figure. The principal structures are the fascia, the sheaths of the recti muscles, and if they are properly brought together, so that the edges are properly coapted, and if union takes place by first intention, there is no danger whatever of hernia. Whether or not the vaginal route is selected for evacuation of pus would depend entirely on the nature of this pus, how long it had been in the pelvic cavity, its true location, whether rupture had taken place in the tube, and whether there was mobility of the tube. If the tube was adherent, if there was present a large quantity of pus, and if the patient showed an elevated temperature, it would be an easy matter to puncture temporarily and drain, with the idea of doing the operation at a later date through the abdomen. On a number of different occasions I have had to operate by the abdominal route on patients who had been operated on per vaginam by reason of adhesions and pain and other annoying symptoms. How many times do we open the abdomen and find the omentum fast to the anterior abdominal wall, to the bladder, to the fundus of the uterus, to the tubes, to the head of the cecum, to the appendix, etc.? How can any man deal with that kind of trouble by going through the vagina? I have never felt favorably toward the vaginal route except when the operation was done only for temporary relief. We all know that the length of time that the pus remains in the pelvis has to do largely with its becoming sterile. If pus is confined in the pelvis for a number of months and the patient does not show an elevated temperature, that pus is almost invariably sterile. In such cases, one may open the abdomen and not even wipe out the pus. Of course, if there is a quantity of pus which would gravitate to the pelvic cavity, it would be a duty to wipe it out, but one can absolutely close up the incision in such cases without drainage and have satisfactory results. This is being done to-day by some of the most able men in the country. In an operation which I performed a few days ago, on making the incision, a large quantity of pus which had been confined for a considerable length of time ran all over everything. I heard from the patient yesterday and she is doing well without drainage. I do not believe that it is possible for a man to cope successfully with the inflammatory conditions mentioned, by the vaginal route.

DR. O. BEVERLY CAMPBELL, St. Joseph, Mo.: It does not seem to me that we should now discuss the possibilities of work done through the vaginal route. Ten or fifteen years ago it was settled that we could operate successfully through the vaginal route in inflammatory conditions of the pelvic organs, and when drainage can be established through an incision in the posterior cul-de-sac it is often a life-saving measure. The tendency is toward the abdominal route because of its superior advantages for complete work.

DR. O. S. McCOWN, Memphis: Some one just now mentioned the fact that the longer pus remained in the cavity the more sterile it became. If there is a collection of pus in the posterior cul-de-sac, that should be incised and drained. If that does not cure the patient a suprapubic operation should be done after some time has elapsed, when it can be done with greater safety than when the infection is fresh. We gain more information sometimes by long observation of a few cases than by hospital observation of a great many cases. I have some cases under observation now in which I drained, posteriorly, cul-de-sac accumulations six or seven or eight years ago. I have observed those cases from that time until now. The suprapubic operation carries with it the idea of removal, not of drainage. All surgical procedures should have associated with them the idea of preservation of organs. If we can relieve a patient by vaginal incision and drainage, leaving the organs intact, if they are not giving the patient trouble, that patient is better off than one having those tubes and ovaries removed. One patient has expressed her extreme

satisfaction at the return of her menstruation after having had an infected extrauterine pregnancy discharged through a posterior vaginal incision. That patient is well up to the present time, six years after the operation. There were excessive adhesions. Recent examinations show that the uterus has become movable and, in fact, is practically normally movable, showing that the adhesions are not giving the trouble now that they did at the time of operation. So, from this standpoint, with reference to the safety of the patient and the preservation of organs, I wish to commend the practice of posterior incision where that is especially indicated, as set forth by Dr. Montgomery.

DR. E. E. MONTGOMERY, Philadelphia: When it comes to actual conditions and the analysis of relative positions, I stand very closely in relation to those who have been so severe in their condemnation of the vaginal route. The vaginal route, however, has a place in the treatment of patients who can be relieved with much less discomfort, with much less danger, and with much less sacrifice than by the use of the abdominal route.

While I have made the Pfannenstiel incision in over two hundred cases, I have not been so fortunate as Dr. Gellhorn. I have had three cases in which hernia occurred. All, however, were cases in which infection had existed. I would not choose this method of incision in cases in which I had reason to believe there was infectious pus within the peritoneal cavity, for the reason that we open up the cellular tissue to much more extensive degree than in vertical incision and it makes it difficult to protect the surfaces from infection.

Clinical Notes

A CYTOLYTIC FACTOR OCCURRING IN THE BLOOD SERUM IN MALIGNANT DISEASE.*

CHARLES E. SIMON, M.D.

AND

WALTER S. THOMAS, M.D.
BALTIMORE.

The following experiments were undertaken in order to ascertain the effect of prolonged exposure of cancer cells to the action of normal as well as to the patient's blood serum, the idea in mind being, on the one hand, that as the result of autoinoculation with degenerative products of the malignant growth autoantibodies of the nature of cytolytins might be formed, or on the other, that the defensive reaction of the body might find its expression in the absence or a diminution of anti-autolytic ferments in the blood serum. That such ferments normally exist has been shown by Opie,¹ among others, in the case of the leucocytes of the blood, and the same principle probably holds good for many other body cells. In the case of cancer tissue also, we could demonstrate that the mineral constituents of the blood serum play no essential rôle in the prevention of autolysis, since emulsions of cancer cells undergo rapid destruction, both when suspended in saline and in Ringer's solution.

The experiments were arranged as follows: The tumor material, removed at operation, was brought to the laboratory as soon as possible and an emulsion was made of the most cellular portions in saline and Ringer's solution, as also in the patients' and normal blood serum. Breast cancer was utilized almost exclusively, as tumors from other sources were usually so extensively infected with bacteria that they were entirely unfit for our purposes. The emulsions were drawn up into

Wright capillaries, sealed and incubated for twenty-four, forty-eight and seventy-two hours at 37 C. Smears were then made on cover-glasses, hardened in alcohol, and stained over night in Giemsa's solution.

The saline and Ringer specimens invariably showed complete destruction of the cells; and it is noteworthy that this will also take place after a much shorter incubation. In several instances marked destruction was observed after several minutes' contact. In normal blood serum, on the other hand, the cells remain well preserved for the full period of seventy-two hours. Incubation for a longer period was not tried, but to judge from the appearance of the cells after seventy-two hours, there would seem to be good reason for supposing that they would stand a still longer exposure.

The behavior of the cells in the patient's serum, on the other hand, was variable. In most cases they remained in good condition here also, but in a few instances, marked destruction was noted after twenty-four hours. In one case this was extreme and occurred after serum and cells had been in contact for a few minutes only; very little difference indeed existed between this and the saline and Ringer specimens. The destruction in this case was so striking and so extensive that we feared there had been some error in technic; but a careful review of every step precludes this possibility, and while we have not seen the same degree of degeneration since, we feel confident that the cause of the destruction was inherent in the patient's serum and not accidental.

The rapidity with which the destruction occurs naturally suggests a definite cytolytic action in the sense of a toxic factor but as we see the very same thing in the saline and Ringer specimens the possibility must be at least admitted that it may be referable to a pure autolytic process, dependent on the absence of an anti-autolytic enzyme. This view finds a further support in the fact that normal sera, which ordinarily preserve the cells so perfectly, lose this power after being heated for thirty minutes at a temperature of 56 C.

Before concluding, an incidental finding, which is both interesting and suggestive, may be mentioned at this place.

On several occasions, while experiments such as those outlined above were being performed, accidental infection occurred in the laboratory, and we were struck with the fact that while streptococcus infection was repeatedly noted in the emulsions made with the patient's serum, and that complete destruction of the cells was then invariably observed, we never met with streptococci in the emulsions made with normal serum. Whenever organisms were here found, staphylococci were seen practically exclusively and it is noteworthy that their presence did not in the least interfere with the integrity of the cancer cell. In some of the seventy-two-hour normal serum specimens staphylococci were at times encountered in large numbers and had actively multiplied, without causing any destruction of the cells, as evidenced by comparison with corresponding specimens which had not become infected.

1302 Madison Street.

Infrequency of Hemoptysis in Tuberculous Children.—Ma-gruder, in the *Archives of Pediatrics*, states that the infrequency of hemoptysis in tuberculous children is probably due in great measure to the fact that they are overwhelmed by the effects of the disease in other organs and glands before the process in the lungs has become distinctly localized and the pulmonary tissue destroyed.

*From the laboratory of Dr. Charles E. Simon.

1. Opie, E.: *Enzymes and Anti-Enzymes of Inflammatory Exudates*, Jour. Exper. Med., 1905, vii, 316.