some length (say a piece of bicycle tire for example) should be held over the patient's face. Under these conditions a slightly excessive amount of carbon dioxide will accumulate in the person's lungs and blood. This amount would probably be sufficient to keep the respiratory center at work when the subject falls asleep. The occurrence of apnea and the terrified awakening would thus be prevented. Dr. Hoover's paper is certainly a valuable contribution to the physiology of respiration.

THE PROPER OPERATIVE PERIOD AND METHODS OF DRAINAGE IN PELVIC INFECTIONS *

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In acute pelvic infections, the mature judgment gained by long experience as to when and how to operate is of paramount importance. Rules of procedure may be laid down, but their proper application is a matter of personal equation.

To operate during the storm of pelvic flare-up frequently spells disaster. Nature must be given an opportunity to corral the infection by adhesions, and to develop immunity against the specific infection. However, if the patient is seen early and the diagnosis is positive, it is good practice to operate immediately. A history of previous attacks will aid materially in determining the course to pursue. Evidences of beginning general peritonitis, such as very rapid pulse or hyperpyrexia, with general abdominal rigidity and tenderness, are counter-indications to early surgical interference.

Cases which develop cellulitis accompanied by a full round cul-de-sac are best treated by a posterior vaginal puncture and a double drainage tube inserted for a few days. This procedure usually gives immediate relief, and entails no surgical risks. Half of these cases so treated would result in apparent cure, and further operative intervention is deemed unnecessary or is refused by the patient.

A large percentage of acute pelvic infections are gonorrheal in origin, and are best treated by palliative means. I believe that experience has taught the profession that gonorrheal infection, in a measure, runs a definite course. Early surgical procedure does not modify the course, and may only serve to spread the infection. Walling off the infected area and the production of active immunity seems Nature's method of handling the situation. The surgeon can do no more.

If there is a history of recurrent pelvic infections, more radical measures are called for than puncture and drainage. If the tubes remain enlarged and tender, and the patient complains of constant pain of greater or less severity, a radical operation should be advised. It can be performed advantageously in the interval, never during the acute attack, except when seen early. I advise waiting until three weeks after the subsidence of all acute symptoms, as evidenced by relief from pain and tenderness and the return of normal pulse and temperature. This will permit time for the absorption of exudate, thereby lessening the amount of adhesions. The inflammatory wall being stronger minimizes the danger of dissemination of infection.

In all chronic cases an operation is indicated when there is evidence of destruction of the tubes. If repeated acute attacks occur, an interval operation is safest and

most advantageous. I have seen many patients treated by palliative means for long periods of time—tamponing, douching, suppositories, pessaries, posture, etc.—and receive temporary relief only.

In all these cases a long history of oft-repeated paroxysms could be elicited. These patients could have been placed in practically a normal condition if an early, careful, radical operation had been performed. During this long delay in resorting to rational surgical treatment, the repeated acute congestions and chronic inflammatory processes result in much gross pathology.

This physical and nervous distress causes the patient's nervous equilibrium to become greatly disturbed, resulting in various neuroses and occasional psychoses. And even after a radical operation these may persist for long periods of time, as it is well known that nervous tissue being the most highly organized, is the slowest of repair. This is but another very tangible and forcible argument for early causal surgery.

There are certain principles in drainage which are almost axiomatic, and failure to comply with them results in the patient's detriment and the surgeon's discomfort. As an example: The lowest level of a cavity should be the highest point for the insertion of the drainage. In other words, a cul-de-sac drain should always be selected in preference to a drain through the abdominal wound. The only exception is that of placing a small wick as a drain in the abdominal incision as a prompt indicator of hemorrhage following myomectomy.

A double rubber tube, by offering a good deal of resistance in order to establish free drainage, is the best drain for a pus cavity. Double tubing allows of free irrigation with reflex flow, and the drain can be kept open more readily if two tubes are used. In cul-de-sac drainage for cellulitis, take a piece of tubing of the required length and bend it on itself at the middle. Place a linen stitch near the two ends and another near the middle to hold the tubes in apposition. This forms a smooth blunt end for insertion into the cul-de-sac. Then make a good-sized opening on the outer sides of the tubes near the point of flexion. The Fowler position very materially aids pelvic drainage.

In cases in which drainage is indicated following a radical operation for pyosalpinx, I prefer an iodoform gauze drain. The drain should be at least one by one and one-half yards in size. An assistant inserts a long forceps per vaginam and holds it firmly in the posterior cul-de-sac, then cuts down on the point of the forceps, when it is forced through and grasps the end of the gauze. Traction is made until the gauze appears at the vulvar orifice. The remainder of the drain is placed in folds posterior to the uterus. This disposal of the gauze facilitates free drainage and subsequent removal. This method of drainage is many times a life-saving agent, particularly in acute cases in which vitality is at a low ebb and resistance to infection and toxins is almost *nil*.

In cases of pyosalpinx of the chronic type in which there has been no evidence of an acute exacerbation for a long period, and the patient's condition is good, no drainage is needed in case of rupture during the operation. The contents of the tube are usually sterile. However, if the patient's vitality is below par or there is the least suspicion of infectivity, it is good practice to insert the drain. The method is very simple and easily executed, and has not, in my hands, added gravity to the case in a single instance.

It had been my custom to remove the gauze cul-de-sac drain entirely at one sitting after five days. The plan advocated by Wertheimer's assistant appealed to me and

* Read in the Section on Obstetrics and Gynecology of the American Medical Association, at the Sixty-Second Annual Session, held at Los Angeles, June, 1911.

I determined to try it. In about fifty consecutive cases I followed his technic, i. e., removal of one-half in five days, one-half of the remainder on the seventh day and the balance on the ninth day. In that series of cases about 90 per cent. developed infection of the abdominal wound, and I abandoned the method.

In my judgment, the infection is caused by a collection of the exudate above the gauze. As the gauze became saturated with exudate, drainage was impeded or entirely stopped, and before the gauze was entirely removed, sufficient backing up of the drainage content caused infection of the abdominal incision. By complete removal at the end of five days this danger is averted. It was further noted that the cases drained much longer when treated by the three-step method, than when the drain was entirely removed on the fifth day.

Since returning to my usual method of removing the gauze on the fifth day, I have had but a single case of abdominal wound infection in about fifty cases. The cavity was much more rapidly obliterated and the infection more quickly subdued.

The administration of a little nitrous oxid gas during the removal of the gauze drain is very advantageous. While I have removed the gauze without an anesthetic, patients have complained so bitterly that it has become my routine practice to induce partial anesthesia.

CONCLUSIONS

Where early positive diagnosis is possible in acute pelvic infections, especially with history of recurrent attacks, early operative interference is good practice.

Evidence of beginning general peritonitis is a positive contra-indication to surgical intervention.

Pelvic cellulitis after localization is best treated by vaginal puncture and drainage.

Palliative treatment of gonorrheal infection during the acute stage, and radical operation when gross pathologic conditions present themselves, is the routine treatment.

Interval operations are advised in the chronic form with acute exacerbations.

In all chronic cases an operation should be done when there is evidence of destruction of the tubes. The sooner done the more likely it is to avert neuroses and psychoses.

The lowest level of a cavity should be the highest point for the insertion of the drainage.

A double rubber tube is the best material in a pus cavity.

Iodoform gauze drain is best where drainage is indicated following a radical operation for pyosalpinx.

Gauze drain should be removed after five days. Three-step removal of gauze causes unnecessary torture and results in infection of the abdominal wound.

ABSTRACT OF DISCUSSION

DR. FRANK T. ANDREWS, Chicago: I think that perhaps ninety-eight or ninety-nine out of every 100 abdominal wounds that one makes should not be drained at all. Drainage is almost never necessary in the drainage of the abdominal cavity for pus tubes. You put the hand in the cul-de-sac of Douglas, rupture the tube and the pus pours out and soils the field of operation. If you wipe that pus out you do not have to make a toilet of the peritoneum, as we used to speak of it, but you get most of it out, close the incision and the patient gets well. If you drain you go to more or less extra trouble and there is no use in it. Almost all of these pus cases have gonorrhea for their inception; not all. That gonorrhea runs a course in the vulva, shows in the uterus and causes the pus

tubes. In time that pus becomes sterile, if it is purely gonococcal pus; or, what is more apt to happen, it becomes a mixed infection, not because the infection is thrown in as a mixed infection, but there are microbes present—the streptococcus, staphylococcus, colon bacillus, the gonococcus—all in that tube, and the gonococcus is the thing that gets out first. If you wait long enough you get sterile pus. I do not like to operate within a very short time—two or three weeks. I prefer to wait. What Dr. Bowers calls an “acute attack” simply means a rupture of the tube and a little extension in the peritoneum. Every pus tube patient gets these ruptures of the sac; that is the soiling of the peritoneum. You never have a patient with a pus tube die of acute peritonitis. Nature throws pus out into the peritoneal cavity, and every time the patient gets well. The only excuse for drainage is the fear that you may have soiled the patient with your own hands.

DR. BOWERS, Dayton, O.: It has been my experience—it may have been the fault of my technic—to see cases in which the pus infection has caused repeated attacks. If you let it absorb you are much more likely to have acute infection than if you put in a drain. There is no use in saying that the pus does not cause infection and that the patients do not die, because I have had this happen and have observed it in other operative cases. Probably in one case in fifty I use the drain. I do not use it promiscuously. No one is more afraid of drainage than I am, but I would rather leave in a drain than let the patient die. The drain does not complicate the case in the least. Those cases will cease draining in four or five days after the withdrawal of the drain. Before the patient gets up the cul-de-sac is closed. Another benefit is that in the cases of excessive adhesion you keep the clean gut out of the soiled field, which lessens new adhesions. I have had less infection of the abdominal wall in cases which are infected and a drain used.

TWO YEARS' EXPERIENCE WITH VACCINES IN PELVIC INFECTIONS *

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In this brief summary on the value of vaccines as an adjunct in the treatment of puerperal and non-puerperal pelvic infections, I shall attempt to describe the class of cases in which the staff of Long Island College Hospital have found vaccines to be of therapeutic use. During our three years' experience, vaccines have been used in almost every case of septic pelvic infection, which has occurred in my several obstetric and gynecologic services.

We have been able, through the courtesy and cooperation of our pathologic department, to make the necessary blood-examinations throughout the entire course of the vaccine treatment, and to study the blood-picture as it appeared before and after each vaccination; so I feel that, while this contribution is but preliminary to a more extended trial, it is our duty to give to the profession at large such data as we have gathered. So many prominent gynecologists speak of vaccine therapy, only to condemn it as useless and unnecessary, that many of the profession, instead of giving it its full clinical value, have come to look on it as a fad of the laboratory experimenter.

It is only by the reports of those of us who have had considerable experience in the use of bacterial vaccines checked by the proper blood-examination before and after each vaccination, that reliable data can be amassed. In my clinics we have applied the injection of bacterial vaccine in every septic case, irrespective of the time at

* Read in the Section on Obstetrics and Gynecology of the American Medical Association, at the Sixty-Second Annual Session, held at Los Angeles, June, 1911.