to the extension of any infectious process as the region of the gall-bladder and pylorus. E. W. Andrews² says:

There is no part of the cavity which has such *invariable* boundaries as the gallstone surgical field. Unlike most parts, it is not subject to the floating in or intrusion of other viscera. Its surroundings, to a certain extent, shut it off and prevent it from draining into or out of the rest of the cavity. In form it is a triangle, bounded above by the liver and appendages, below by the colon and mesocolon, and to the left by the stomach, gastrohepatic omentum and duodenum. . . . This space can also be conceived as a spherical triangle, or as a pyramid, with its base on the abdominal wall, and its apex in the foramen of Winslow.

Who now would think of carrying infectious pus over these natural bounds and into the surrounding cavity by the aid of irrigation? Yet the same rule holds good for any portion of the abdomen and is equally true of appendiceal rupture and perforations in typhoid.

The reaction caused by such great mortality following flushing of the abdominal cavity in acute diffuse suppurative peritonitis has come in the method of treatment of which Ochsner was the first and foremost advocate—absolute rest with no operative interference—thus allowing Nature to do her best. This after all is what the treatment consists of, and when Nature is undisturbed how does she attempt to contend with the invasion? Pathology teaches us that the local changes are first a serous exudate which later becomes fibrinous in character. This we know is the means by which the infection is walled off and abscess formation occurs. Why, then, should we wash this exudate away and thus prevent, or at least retard, such a result by means of irrigation? In the local exudate, as well as in the entire blood stream, a great increase in the number of leucocytes can always be observed, and while as yet we do not fully understand what part these leucocytes play in the resistance to infectious processes, yet we know that they play a part of much importance in the successful issue of these cases. These also are washed away when irrigation is employed. Outside of this, Nature protects with chemical substances which we term antitoxins, but we look upon these not as a local product to resist infection, but rather as a general one. However, the amount of such a substance required will vary directly with the intensity of the infection, which may be said to be governed partially by the area involved.

It is a common clinical observation that shortly after irrigation of any abdominal abscess there is a noticeable rise in the temperature of the patient. This we ascribe to increased absorption, that is, we have not only washed out the debris of dead cells, but the protecting exudates covering the peritoneal surface have also suffered and new exudates must be formed before the toxic products are again separated from direct contact with the blood stream and lymphatic channels. A given organism will soon die out if kept in the same test-tube, but if new media be constantly added or frequent transplantation take place its life may cover a greatly extended period.

Realizing then that Nature's most efficient safeguard is in the formation of adhesions and that the percentage of cases in which these cause permanent after trouble is very small, let us consider how we can best aid in what Nature has failed to do. From a bacteriologic standpoint irrigation is entirely contraindicated. The surgeon will tell you when the abdomen is opened because of any infective process that drainage is the object sought. A large perforated rubber or glass tube furnishes the best means of obtaining the freest drainage, and this is frequently used and with most satisfac-

tory results. However, always in conjunction with this and sometimes alone, one or more gauze drains are inserted into the abdominal cavity. This is done because clinical experience has taught the surgeon that his patient will do better and that recovery in a greater percent. is assured if the gauze drain be used. Given the choice between gauze and tube drainage and, I venture to say, by far the majority of surgeons would choose the gauze, and their reason would be that clinical experience proves that the mortality is far less when this form of drain is used. Now why should this be so? To my mind the answer is found by reverting again to that second factor in the causation of the mortality, namely, the area involved. At present we have no substance which is so effectual in the stimulation and formation of adhesions as sterile gauze. The gauze drain helps Nature to build up that safeguard which she is called on to supply, and hence helps to limit the area of infection. After three or four days this drain, which has played so useful a part in the limitation of the area involved, may become an absolute menace, for when the exudate has become dried upon its surface it plays the function more of a cork than a drain. But by this time the adhesions are well formed and the tube should be substituted for the gauze, since free drainage is now the essential in order that the pressure within the abscess may be as small as possible, and thus render slight the danger of infecting that portion of the abdomen without the abscess by rupture of the same.

It is my opinion that the habit of irrigation in infectious conditions of the peritoneum is a pernicious one, absolutely without either scientific or clinical endorsement, and one which appears to be as difficult for the general surgeon to give up as anterior suspension or fixation has been for some gynecologists. Many of the leading surgeons have abandoned irrigation in peritonitis from appendiceal trouble, it is true, and their results alone should cause others to follow in their steps. Why should the same principle not be adopted in typhoid perforation, and, indeed, perforations from all other causes? I believe that if such a course were to be adopted the present mortality would be markedly reduced.

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THE CONSERVATIVE SURGERY OF THE TUBES AND OVARIES.*

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LOS ANGELES.

It is twenty years since Schröder first advocated the preservation of the remnant of normal ovarian substance in excision of small cysts of the ovary. August Martin, about the same time, reported a number of cases in which normal portions of the tube and ovary were preserved and the degenerated portion removed. W. M. Polk a year or two later presented the same subject to the American profession and submitted his brilliant results in the conservation of these structures. Since that time contributions have been made to this field of work by Dudley, Kelley, Morris and others, showing definite results in relieving pain, establishing normal menstrual function, and, in a number of instances, being rewarded by seeing the patient bear children.

There could be slight excuse for calling attention at

* Read before the San Bernardino (Cal.) County Medical Association.

this late day to the many ingenious procedures for the partial restitution and preservation of these structures so vital to the happiness and well-being of women, were it not a fact that these possibilities are still grossly and continually disregarded. There is scarcely a week passes without the painful evidence of some patient suffering a loss, to her irreparable, of either one or both ovaries and tubes, ablated for ovarian neuralgia, hydrosalpinx, obliterating salpingitis, or worse than all possibly, simple ovarian cyst with minor adhesions.

The mental distress which overcomes these unfortunate subjects in the sudden and artificial induction of the menopause, the deprivation of the possibilities of motherhood, the definite belief that they are to become shattered and to lose those delicate and essential elements which distinguish their sex—these realities and fears are sufficient in themselves to cause any surgeon to reflect on his responsibilities. And no one of even moderate experience will question the frequency of the appalling consequences of this crude and wretched work.

The prevalence of long obsolete procedures in surgical technic is no fault of our masters, who have filled the literature of every language with a modern gospel which is free to all of us. The fault is ours and lies stark and accusing at our own threshold. We are not guiltless, if in our apathy we have not harkened to good teaching nor heard the warning for him whose crass ignorance shall cause innocent ones to suffer through long and helpless years.

Improvement in this field of work is to be looked for in a more patient and careful study of the pathology of ovarian and tubal disease. It is necessary to get away from the fads which have misled us and drawn us unthinkingly after false teachers, who would find in the extirpation of a vital and essential organ the relief from a painful symptom. It is necessary to distinguish between surgical procedures which are mutilating and those which are conserving and remedial. Only by thoughtful and studious consideration of the physiology and physiologic chemistry of these structures and the relative degrees of existing pathologic change can one found a judgment which has enduring value.

The wild claims of the advocates of Battey's operation are fresh in the minds of all of us. Many, if not most of us, I daresay, have been blind followers of the blind in this grievously erratic doctrine. We can atone for these errors only by a persistently earnest effort to analyze our cases with greater conscience and precision, and to choose a surgical procedure which will the most perfectly restore the organ to its normal function.

It is beyond the limits of this paper to discuss the multiform influences contributing to disease of the pelvic organs. Outside of the violences of incorrect diet, bathing, clothing, exercise and social dissipation, there is that great trinity—septic metritis, gonorrhea and tuberculosis—which forms the sum total of concrete disease of the tubes and ovaries.

It may well be said at this juncture that any and all of these conditions might be prevented, and that it were more philosophic to deal at length with measures looking to the prevention of these potent infections than to efforts to preserve the shattered remnants of their destructive work. We need have no quarrel with the sanity of this idea, and preventive medicine has no fairer field for its cleverest effort, but the surgeon is still the latest to be called and is confronted by a complicated pathology which admits of but one appeal.

CONSERVATION OF THE OVARIES.

This discussion need not deal with those large ovarian

cysts, now so rarely met, in which all ovarian substance has perished, nor with extensive dermoids, hematomata, parovarian cysts or that extremely rare neoplasm, fibroma of the ovary. Carcinoma, tuberculosis and abscess call for the total extirpation of the affected ovary and, in the first two, frequently of the uterus and adnexa. It is possible, however, to save an ovary partially destroyed by a small abscess. It is just as rational and defensible as to spare the parotid, mammary gland or testicle under like circumstances.

The commonest affection of the ovary calling for surgical relief is the small cyst. These cysts usually occur in numbers and they vary greatly in size. They may be pseudo-retention cysts—unruptured Graffian follicles—or true cystic degenerations of the corpora lutea. In any case they add a preternatural weight and create a tension in the tunica albuginea which results in a dragging burning weight and in so-called ovarian neuralgia. I have seen many cases in which this excessive weight threw the uterus backward out of its normal axis and held it tight against the rectum in the hollow of the sacrum. Often these large cystic ovaries become imprisoned deep down in the cul-de-sac of Douglas, acting like spherical valves, the force of whose suction not only keeps the vessels in the tube, ovary and broad ligament congested, but produces and maintains a dorsal version which is both painful and obstructive. In almost every instance the tunic will be found greatly thickened, causing ovulation and the menstrual period to be very painful.

A great deal was said in former years concerning the "cirrhotic" ovary. We know now that this is a myth and that what was designated ovarian "cirrhosis" was nothing more than a somewhat distinctly defined collection of the scars of ruptured follicles. No doubt there are women in whom the ovaries show a tendency to contract and, through the physiologic process of ovulation, to lose parenchyma which relatively gives the appearance of increase of stroma. That condition, however, is no more pathologic nor is it more frequent than the hypertrophic ovary which I have met repeatedly and which in some cases I have observed to be twice the size of the normal organ. Microscopic examination shows a relative increase in the reticulum in the one case, in the parenchyma in the other. Neither condition is pathologic, although I have found that removal of at least half of the hypertrophied ovary gives immediate relief from the weight and burning. Many so-called cirrhotic ovaries are doubtless the remnants of previous small ovarian abscesses or the result of adhesive bands from septic inflammation of the uterus and tubes. In these cases the irritating scar may be resected and the normal portion of the ovary left, and this may be laid down as the rational surgical procedure in every instance of ovarian pathology, save the exceptions heretofore mentioned. It may be stated dogmatically that oöphorectomy, except in this restricted sense, is not only obsolete, but that it is utterly wrong and unjustifiable, and this doctrine will apply to at least 90 per cent. of all pathologic ovaries.

The technic of excision of the cysts and degenerated portions of the ovary is not difficult, but calls for nice dissection and delicate suturing with fine plain catgut. It will be found that in many instances the walls of these cysts can be peeled out with fine dissecting forceps as soon as the tunic is incised. The incision should pass through the superior edge in the long axis of the organ and it will be found that at the base there is much ovarian tissue which is absolutely normal.

I can recall many patients operated on for tuberculosis or for septic destruction of both tubes and apparently of both ovaries, in whom it was possible to leave ovarian substance at the base of one or both ovaries not larger than an olive seed. These women all began to menstruate at periods varying from two to six months after the operation and with but slight irregularity. There has not been one of them in whom this function has been effaced, and within a year all of them became as regular as the average normal woman.

In one case of caseous destruction of the entire left tube and ovary and of the right tube, and all but the submerged base of the right ovary, from tuberculosis it was possible to save the merest portion of the base of the right ovary. This patient has had irregular, and at times, suppressed menstruation for fifteen years and has also suffered from pulmonary tuberculosis. Before the operation she menstruated irregularly at intervals of from two to four months. After her operation there was no sign of return of the period, except a headache from congestion, for three months. She then flowed slightly for a day and a half, but not until the sixth month was the menstruation fully re-established; even then it was attended by some pain. Now, two and a half years later, menstruation occurs regularly, lasts three days, and gives as little discomfort as is usual in normal women.

In a number of other patients the destruction of the ovary has been less than in this case and the re-establishment of the menstrual function has been relatively earlier and less eventful. In a still larger class of patients one of the ovaries may be almost or quite totally destroyed and the other partially or wholly normal. In such the excision of the diseased tissue leaves no incident of note in the perfectly normal menstrual cycle.

Ovarian grafting in young women who have previously been subjected to ovariectomy is still in the experimental stage. Knauer's experiments on rabbits in 1896 showed that autotransplantation of an excised ovary within the broad ligament resulted in continuance of ovulation. Hetero-transplantation has resulted in degeneration of the ovary thus transferred from one animal to another. In a recent contribution by Robert T. Morris, comprising a résumé of the latest work in this field, including his own, these conclusions are drawn:

1. When the ovaries are removed from an animal and then replaced at some point near their original site or even at distant points, the tendency is for the ovary to continue its function of developing ova and of furnishing its internal secretion. Such transplanted ovaries may continue to do normal work for an indefinite period.

2. When ovaries are removed from one animal and transplanted into another animal of the same kind which has had the ovaries removed, the tendency is for the grafted ovary to undergo a degenerative process. The graft will continue to furnish ova and internal secretion for several months in some cases, but at the end of a year we often find the grafts fatty and apparently useless. We assume that the serum of one animal is destructive to the introduced tissues of another animal of the same sort. My present line of investigation is toward making one series of rabbits immune against the serum of another series and then exchanging the ovaries of the two series. If this can be accomplished, ovarian grafting will be placed on a plane of usefulness much above its present one.

As the possibilities of conservative surgery on the ovary are better understood we shall have fewer subjects requiring transplantation. In fact, it is simply the substitution of a rational artistic technic for a crude and ruthless sacrifice of vital structures.

CONSERVATION OF THE TUBES.

In the uterine tube we have a structure which in both its histologic and anatomic characters becomes at once a more complex problem than the ovary. Partly on account of this involved pathology the ovary has frequently been sacrificed with the diseased tube. This practice has doubtless grown from the fallacy that if the tube be partially or hopelessly destroyed the ovary is likewise in a hopeless condition and should be removed also. No more pernicious doctrine than this could prevail. Each organ must be considered and treated with regard to its own pathology, and the fact that certain organs are anatomically contiguous and may be closely related by blood and lymph currents and nerve supply is by no means just cause for sacrificing both organs when but one is diseased. There are many mild infections outside of the strictly pyogenic, gonorrheal or tuberculous that may cause the lumen of a tube to become obliterated. I have often found the isthmus constricted and the *ostium abdominale* partially closed in young unmarried women, with neither a history nor pathologic evidence that any infection, however mild and innocent, could have occurred. Yet at some time when the uterine mucosa was most susceptible a slight endometritis had extended to the tubal lining and through successive attacks had produced the hyperplasia necessary to cause occlusion.

There is also good reason for the belief that bacteria from the appendix on the right and from the epiploic processes of the sigmoid on the left have been definite factors in the closure of the ampulla at the fimbriated extremity. Whatever the etiology of these milder infections, on account of which the tube ceases to be patulous, we have in this obstruction a cause of sterility as actual and permanent, until relieved surgically, as from a septic or gonorrheal infection. And it should be remembered that fully a third of the patients in private practice presenting themselves for relief from sterility are suffering from the results of these milder infections. The frankly septic and gonorrheal infections very naturally cause the most destructive and complex deformities of the tubes and call for a correspondingly radical treatment. Fortunately for the operator, unfortunately for the fate of the tube, the best practice that is now known to us is to await the subsidence of the acute process before surgical interference is justifiable. Whether we shall ever venture as a rule of practice to treat these abscesses early before extensive destruction of the tube occurs is doubtful.

A better understanding of the means of arresting the infection before it passes in any degree beyond the uterine mucosa is necessary. This gained, the conditions in the tube will be found more amenable to early cleansing and drainage and by so much the early treatment of sub-acute septic and specific infections of the tube will be practicable. Even as it is one is continually surprised to see how remarkably well these extensive infections clear up and leave tubes which seem hopelessly deformed, astonishingly free from evidences of damaging inflammation. It may be necessary to do more than one operation on these structures. It will always be necessary to apply the most discriminating judgment and careful technic in regard to the incision, the matter of drainage and in arriving at a decision as to what portion, if any, may safely be removed. Yet it is most gratifying to find in how many instances the surgeon is well rewarded for the care and pains taken to save his patient these priceless structures.

In tuberculosis—an infection of the tube which we

are identifying far more frequently than heretofore—little as yet can be offered of a conservative character. Theoretically there should be no justification for sacrificing an apparently sound ovary or tube. If one is infected and the other not it would seem to be reasonable practice to leave the sound tube, even though a later infection should occur and a second operation be necessary. This doctrine would be beyond controversy did we actually know that the endometrium and the lining of the sound tube were uninfected. In the light of our present methods, however, we can not know, and hence we must be guided by clinical experience; this has taught us that when one tube becomes manifestly tuberculous infection of the other is almost inevitable and that in this infection the uterus is frequently first. With this pathology we now know but one safe course of action—total extirpation. The future should hold something better than this.

The technic in tubal surgery must depend largely on the character and degree of infection and the extent of destruction and deformity. In simple stricture at the isthmus, resection of the isthmus and the anastomosis of the ampulla with the proximal end of the tube near the cornu, offers good results. A cord of heavy plaited silk should be anchored in the ovary and the other end carried down through the uterine cavity to a gutta percha bobbin in the vagina to insure the mucous tract remaining patulous during the repair of the anastomosis. I have known pregnancy to occur within three months following this procedure.

When the mouth of the tube has closed by a sealing over of the processes of the fimbria the adhesions, which are usually thin and delicate, should be opened up, the cavity of the ampulla carefully syringed out with salt solution and the edges of the released fimbria folded back over the tube like a cuff and tacked there with interrupted stitches of fine catgut.

When the tube is angulated or kinked by fine dense bands these should be snipped and the tube straightened out, and if a stricture persists the dorsum of the tube should be laid open and the lumen given the usual toilet. Attempts to probe the tube are usually so fruitless that such injury as is sure to result should be avoided. Careful syringing with salt solution in a fine syringe is far safer and more effective.

In tubes which have been septic or gonorrheal and in which active cocci no longer exist, or in mild types of hydrosalpinx, the occluded tube should be opened up, cleansed and the cystic portion utilized as an ampulla. If perfectly free from infective material the dorsum of the obliterated portion of the tube may be laid open and a silk cord passed downward as in the case of anastomosis already described. Frequently these tubes will be found patulous just proximal to the barrier of the cyst wall and the incision may cease a line or two beyond it.

When the tubes are large pus sacs it has been customary to remove them and, commonly, the uterus. It remains to be seen if we shall not be able to do better than this by carefully and properly applied drainage in a series of operations. It can not be denied that so far little of merit in this direction has been recorded; yet if we were to quail at a septic tendovaginitis in the hand and wrist, as we do at conserving pus tubes in the pelvis, what a melancholy showing we should have. Possibly a little more patience, a little more plodding, a little more dogged belief in Nature's regenerative power when nicely and intelligently aided, would be rewarded here as elsewhere, in fields more difficult but not more worthy.

What has been said of preserving the tube when impaired by infection will apply with equal force to tubes changed by ectopic pregnancy. A tube should never be sacrificed if it is possible to save it or even a portion of it, for the normal one may suffer soon in like manner and both thus perish.

In every instance of conservative work on the tubes and ovaries the uterine cavity should be thoroughly curetted and cleansed, since it may be necessary to establish and maintain communication for several weeks between the abdominal cavity and vagina through the uterine canal. That this can be done with perfect safety has been repeatedly proved, but the price is strict asepsis, both as to the sterility and toilet of the tubes and after toilet of the vagina.

It will often be found necessary to shorten the uterine round ligaments to correct version and descent, and this should not be overlooked.

The results of value in a certain procedure are the end results. I know of none more positive or beneficent than in this field, provided careful judgment and attention to minute detail is faithfully observed. My hopes will be more than realized if this paper shall serve to revive a just interest in a field by no means worked out and one in which conservatism will be of much benefit to the race.

THE VALUE OF ALCOHOL IN CARBOLIC ACID POISONING.

A CLINICAL AND EXPERIMENTAL STUDY.*

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1. INTRODUCTION.

The use of alcohol as an antidote in carbolic acid poisoning was first brought before the medical profession by Dr. Seneca D. Powell of New York City. At his clinical lectures, from about 1894 on, he was in the habit of demonstrating his theory by such an experiment as washing his hands in pure carbolic acid and then in alcohol, and had even filled his mouth with the pure acid, and by quickly rinsing it with 95 per cent. pure alcohol had experienced no harmful results. From these experiments he made the statement that alcohol is an antidote to carbolic acid, and suggested its being used internally in cases of poisoning. The results of his five years experience were reported to the Medical Society of the County of New York Feb. 27, 1899, and appeared in the reports of this society.¹ He, however, had had no practical experience in poisoning cases and goes no further than to mention a case of which he had heard of a one-month-old infant, who, after swallowing the strong acid, had been given a teaspoonful of whisky, though apparently moribund, and had recovered temporarily. Furthermore, this child, having died eight days later of pneumonia, showed no signs of an eschar in the stomach.

The first mention of alcohol as an antidote from a clinical standpoint is in the report by Donald B. Fraser² of a patient who took an ounce of the pure acid in a glass of whisky, and, though unconscious for eight hours,

* From the Medical Service of the Lakeside Hospital and the Pharmacological Laboratory of Western Reserve University.

1. Powell: Medical Record, New York, 1899, vol. iv, p. 372.

2. Fraser Ibid., 1899, vol. xviii p. 741.