it should be disinfected by the generous use of chloride of lime and after 24 hours the water should be completely pumped out. The source of the pollution should be sought and the passage way which was followed by it traced, if possible, and removed or disinfected, after this the well should be treated as already mentioned.

The best method of carrying this out is by pouring into it a solution of the chloride. This solution of chloride should be added to the well in the proportion of five parts of available chlorine per million parts of water or one pound of the chloride of lime to every 332.6 cubic feet of water, or 25,000 gallons.

On several occasions, chlorine gas in liquid form has been used in my experience, but owing to the more destructive action of the gas on the various metal connections and fittings, it has been invariably found necessary to discontinue its employment. While it may be more satisfactory from the fact that it is more easily handled and that we do not have the sludge difficulty to contend with, disinfection by the chloride of lime method and by the rapid sand filtration method at present have the preference.

THE TREATMENT OF ACUTE PELVIC INFLAMMATION IN THE FEMALE*

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THE term "acute pelvic inflammation" is used to describe a group of cases that cannot be properly designated by any more definite name; a group in which all, or most of the pelvic structures are more or less affected. Thus it might not be correct to speak of acute gonorrhœal endo-cervicitis as acute pelvic inflammation, whereas an acute gonorrhœal salpingitis might quite accurately be so described, since the uterus, ovaries, peritoneum and cellular tissues with their lymphatics and blood vessels might all to a greater or less extent be involved.

From the standpoint of treatment, the most important preliminary consideration is a classification based on the various ætiological factors which may give rise to pelvic inflammation. Thus we may have:

1. Infection following full term labour, accidental miscarriage or abortion.
2. Infection associated with some traumatism to the pelvic tissues, such as surgical procedures, or attempts to produce abortion.
3. Infection secondary to new growths, such as sloughing fibroid, or carcinoma.
4. Infection by specific micro-organisms, such as the gonococcus.
5. Infection from an extra-pelvic cause, such as appendicitis, or diverticulitis.

It is worthy of note that all the above ætiological factors, except the relatively few in group 3, are or should be entirely preventible, and it is consequently axiomatic that the best treatment of pelvic inflammation is prophylactic.

It may further be laid down as a basic principle that the treatment of every form of *acute* pelvic inflammation is essentially medical, and entirely expectant, and that the aim should be to so assist and strengthen the defensive forces of the body that they may overcome the infection, localize the inflammation, and eventually cause the absorption of the products of tissue reaction.

Rest in bed, frequent hot vaginal douches, ice to the lower abdomen, proper attention to nutrition and to elimination, with a judicious use of antitoxins and vaccines, are general measures which by themselves will permit of the cure of the majority of these cases.

Pathologically, pelvic inflammation may affect chiefly the uterus, the pelvic cellular tissues, the pelvic peritoneum, or the appendages, but since in every case each of these tissues is involved to a

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greater or less extent it is more convenient to discuss treatment according to the ætiological factors concerned.

(1) *Infection following full-term labour, or accidental miscarriage or abortion.*

This group may be infective or septicæmic from the beginning, especially when following instrumental delivery with extensive laceration of the cervical zone, but probably the majority of these cases are sapræmic in origin, the symptoms depending on absorption of toxins from decomposing placental debris or blood clot.

Referring to each, it is important to note that the symptoms have followed the expulsion of all or of most of the uterine contents, and that as a consequence the cervix is dilated or easily dilatable. Under these circumstances, when threatening symptoms arise, the first essential is to determine that the uterine cavity is free from placental remains, decomposing blood clot, or retained pus, as may be seen for instance in acute retroflexions.

It is important to remember that sapræmia or absorption fever is rarely a distinct entity, but rather a condition of balance between the invading micro-organisms and their toxins on the one hand, and the protective forces of the body including the leucocytic zone on the other. Slight injury to the latter, without complete removal of the former, may easily permit a mild sapræmia to develop into a severe septicæmia.

The operation of clearing out the uterus is therefore not one to be lightly or carelessly undertaken. It requires considerable attention as to detail, and unless it can be done thoroughly is much better not done at all.

The patient should be prepared as for an aseptic operation, the vagina repeatedly flushed until absolutely clean, and a culture made from the cervical discharge. If the cervix is patulous the ungloved finger is the best instrument for determining the condition of the uterine cavity, for recognizing small pieces of adherent placenta, and for removing the same.

In certain cases where the placental remains are more adherent than usual, small polypus forceps introduced with the finger as a guide will be useful, or occasionally a loop curette may be of assistance. In no case should a sharp curette be used, and the term "curettage" should not be applied to this operation. In the class of case now under discussion, if the cervix is not dilated sufficiently to admit the finger, it is quite permissible to gently dilate it to the required extent. When the examiner is satisfied that the uterine wall is everywhere smooth and free from adherent debris, the uterus should be thoroughly irrigated with a mild antiseptic, the cervix being meanwhile maintained widely open. The uterine cavity and cervix should then be lightly packed with iodoform gauze, both for its slight antiseptic action, but more especially for its effect in stimulating uterine contraction and thus shutting off lymphatic absorption. For the same purpose a preliminary dose of pituitrin should be given, after which ergot and quinine should be administered. The packing should be removed after twelve hours and a hot vaginal douche given. It is also our custom to give a preliminary dose of "stock mixed infection vaccine" at the time of the operation. This may later be repeated or modified, depending on the course of the infection, and upon the laboratory report of the cervical culture.

If now the symptoms rapidly subside, the case may be set down as having been one largely of sapræmia, and an attitude of watchful waiting will be all that is necessary.

If on the other hand the condition is progressive, it is evident that it is one of septicæmic infection, and further interference with the uterine cavity is useless. From this time on the treatment is similar to that of primary septic infection, and will be discussed later.

2. *Infection associated with traumatism to the pelvic tissues.*

This group readily falls into two divisions, viz:

(a) following surgical operations,

(b) following attempts to produce abortion.

The first division requires little comment at present, since the operator knows exactly what was done, and hence is in a position to treat symptoms as they arise. Relief of tension by removal of sutures, hot irrigations and other general measures will of course be indicated until the further course of the condition becomes plain.

With regard to the prophylaxis of infection following surgical operations on the pelvic organs, stress should be laid on the inadvisability of doing reparative work until a considerable time has elapsed after parturition or miscarriage. We have learned much of recent years as to the ability of bacteria to lay for months dormant in the tissues, only to be stirred into vigorous activity by the traumatism of an operation, and the most severe infections with which I have had to cope have been in cases where operation was undertaken at too early a period after childbirth.

The second division often presents a considerable number of difficulties. In the first place, it is usually impossible to secure an accurate history of what was done. Secondly, the infection often precedes the uterine evacuation, and consequently the cervix is usually hard and unyielding. Thirdly, the infection may have been introduced into the pelvic cellular tissues, or even into the pelvic peritoneum directly by punctured wounds from gum elastic catheters, hair pins, or other implements, and consequently the uterine cavity and its contents may not be infected in the slightest degree. Under these later circumstances, to dilate a rigid and infected cervical canal, to introduce instruments for the purpose of clearing out the uterus—since dilatation to admit the finger can rarely be secured, and thus add additional traumatism and infection to that already present—would appear to be very bad treatment. Of course it is evident that all gradations between such a hypothetical case and one in which the catheter has entered the uterus without parametric damage, causing sufficient disturbance to the contents to bring about uterine contraction, and hence some degree of cervical dilatation, will occur, and consequently each case must be treated on its merits. Arguments as to the relative advantages of active and conservative measures in cases of septic abortion have been very prolonged, but at the present time the concensus of opinion appears to very definitely favour a policy of non-interference, unless there are definite indications to the contrary, of which perhaps the only really important one is severe hæmorrhage. The correctness of this attitude is well substantiated by the results of the intensive study which has been made by Hillis (1) of the cases of septic abortion admitted to the Cook County Hospital in Chicago.

3. *Infection secondary to new growths, such as sloughing fibroid, or carcinoma.*

This group is rarely responsible for *acute* inflammation, although suggestive symptoms may occur due to sapræmic absorption from a sloughing intrauterine fibroid. The treatment is that of the causative condition.

Under appropriate treatment, the acute pelvic inflammation following any of the above conditions may rapidly subside. If however the symptoms persist, or tend to become aggravated, indicating that the inflammatory process is extending, it will usually be found that this extension is taking place in either of two directions, depending on whether the infective process is located chiefly in the pelvic cellular tissue, or chiefly in the pelvic peritoneum. In either case the treatment should be along the general lines already laid down, until some definite indication for operative interference presents itself. The extent of the inflammatory mass which may form in pelvic cellulitis, and the degree of fixation of the uterus and other pelvic structures which may occur, is surprising, but not nearly so surprising as the absolute absorption of the same which may occur under expectant treatment. A careful watch should be maintained for bulging and softening in either of the fornices or in the pouch of Douglas, and if abscess formation is suspected its presence may definitely be shown by the careful use of a small aspirating needle. If present it should be opened through a vaginal incision behind or to the side of the cervix as may be indicated. After the vaginal wall is incised approach to the abscess may safely be made by a slender pair of forceps introduced closed, and withdrawn open, or if preferred the finger may be introduced through the vaginal opening and used as a guide for a pair of sharp pointed scissors, which are advanced closed, keeping close to the cervix, then opened to dilate a tract which the finger may follow. If the abscess is in the broad ligament the peritoneum should not be opened, while if it is in the pouch of Douglas care should be taken not to open or disturb the overlying layer of protective adhesions, and in either case the cavity should be drained by a self-retaining rubber tube. It should not be irrigated, and the tube should be retained in place, or possibly changed for a tube of smaller size, until the cavity is almost obliterated.

Certain cases of broad ligament suppuration will not present in the vaginal fornix, but will become evident as a tender swelling in the groin. These are best reached by an extra-peritoneal dissection over the inner half of Poupart's ligament.

Finally: what is to be done for those cases of frank pelvic peritonitis resulting from any of the above ætiological factors, where there is no attempt on the part of nature to localize the inflammation, but where on the contrary the peritonitis is definitely spreading? The fact that most of these cases are suffering from a generalized septicæmia or pyæmia, of which the peritonitis is only a part is sufficient reason for expecting a high death rate whatever the treatment. One feels however, where the peritonitis is the most striking feature as evidenced by local pain, rigidity, vomiting and distension, that occasionally we can save a patient by supra-pubic pelvic drainage. Fowler's

position and the Murphy drip. In the acute cases now under discussion I have not seen any greater benefits accrue from more extensive operations, such as hysterectomy, than from drainage alone, and the immediate mortality is certainly higher.

Cases of spreading thrombosis usually arising in connection with pelvic cellulitis are rather part of a subacute condition than acute. Attempts have been made to ligate the vein—especially the ovarian—above the thrombosed area, and to remove the affected part, One is not overly enthusiastic about the results thus secured.

A discussion of the treatment of generalized septicæmia and pyæmia is not part of this symposium, and it may suffice to say that the antitoxins have disappointed us, the vaccines are too slow, and that possibly the future may demonstrate the value of the intravenous injection of antiseptics such as eusol, or of the transfusion of blood from immunized persons.

4. *Infection by specific micro-organisms.*

Under this head we may at once dismiss syphilis and tuberculosis as not being the cause of acute pelvic inflammation. On the other hand gonococcus invasion of the Fallopian tubes and contiguous structures is probably one of the commonest causes of this condition. The inflammation may be largely confined to the Fallopian tube by sealing of the fimbriated end producing pyosalpinx, may involve the ovary by contiguity, may cause tubo-ovarian abscess, or may extend to the pelvic peritoneum, causing extensive peritoneal reaction. In certain cases the infection passes through the tube rapidly and precipitates a spreading peritonitis, without any definite pus collection occurring in either the tube or ovary. In any case the peritonitis is remarkable for its adhesive character, a large amount of fluid exudate being rare, and when the abdomen is opened the usual appearance is of distended loops of bowel, intensely congested, and glued together by a croupous exudate. I am of the opinion that surgical intervention is distinctly contra-indicated in every case of acute pelvic inflammation, whether tubal, tubo-ovarian or peritonitic, in which the gonococcus is the ætiological factor. If peritonitis is not present it certainly will result from attempts to remove an affected tube or ovary during the acute stage, and if it is present and spreading, it will not be benefitted by an attack on the appendages, or by any form of drainage. It is of course evident that these remarks apply definitely to the acute stage only. When this has subsided the gonococcus rapidly becomes inert either through death of the organism, or through the development of protective mechanisms on the part of the body, and then it is equally true that surgical interference may be imperatively indicated, and it is surprising with what safety and with what absence of reaction a pelvic mass consisting of tubes, ovaries, and uterus may be extirpated, or a bilateral salpingo-oophorectomy performed. In the acute stage the only question is one of diagnosis. It must be remembered that one who has gonorrhœa may become pregnant, or think that she is, and attempt to produce an abortion. In this case the ætiology of the pelvic inflammation may be obscure, but the case should be treated conservatively until the diagnosis can be made. The only condition in which operation should be considered is that where there is a reasonable possibility that appendicitis is the cause of the pelvic inflammation, because of course the presence of gonococci in the urethra or cervix does not eliminate the possibility of appendicitis.

5. *Infection from an extra pelvic cause, such as appendicitis, or diverticulitis.*

Since diagnosis is not the subject of this contribution, I will merely point out that no common problem requires more judgment in its elucidation in a certain proportion of cases than the differentiation between acute appendicitis and acute oophoro-salpingitis, and in perhaps no other class is the successful outcome more dependent on the accuracy of the diagnosis, and on the carrying out of he indicated treatment, operative on the one hand, and conservative on the other.

The same remarks apply with somewhat less force to diverticulitis of the sigmoid, but the symptoms in this condition are rarely as acute, and an accurate history and careful roentgenological examination will usually permit of the proper diagnosis and of the indicated treatment being carried out.

REFERENCE—

HILLIS—"*The Treatment of Abortion:*" Surgery, Gynæcology and Obstetrice, Vol XXXI December, 1910, p 605