of the fissure to be a contraindication to the use of this method. The sentinel "pile" is usually a small oedematous tag which on several occasions I have observed to disappear when sphincteric relaxation has been obtained by injection of A.B.A. In other cases the tag has subsequently been excised, either without further anaesthesia or after injection of a few drops of novocain. I believe this method will sometimes prove of value even in the case of an undermined fissure; if the sphincter has been made to relax I see no reason why an undermined tag should not be removed locally and successful healing obtained. In a few cases I have given a second injection of A.B.A., but as a rule the relaxation lasts sufficiently long for the fissure to heal, and the spasm then does not return. In one case, described below, injection of A.B.A. was of particular value in that it allowed adequate examination of the rectum (at first impossible on account of pain) to be performed a week later, when a large fibrous polyp in relation to the upper end of the fissure was discovered and accordingly removed. In no case has there been any history of incontinence from lack of sphincteric tone.

The following cases may be taken as representative of the series.

Case 1.—A married woman, aged 30, with a very painful dorsal fissure of eight weeks' duration. She was given an injection of 2 c.cm. of A.B.A. One week later the sphincteric spasm had disappeared and the fissure had healed. She was discharged fourteen days after the injection.

Case 2.—A married woman, aged 33, had a dorsal fissure with sentinel tag; duration two weeks; the sphincter was very spastic. On February 19th 2 c.cm. of A.B.A. was injected. On February 26th the sphincter was quite lax, and the patient was discharged on March 12th, the fissure being healed, and the sentinel tag had almost disappeared.

Case 3.—A married woman, aged 29, had a dorsal fissure with spastic sphincter and sentinel tag; duration two years. On January 8th 2 c.cm. of A.B.A. was injected. On January 15th her condition was much improved; the sentinel tag was excised without further anaesthesia. On February 5th no symptoms were present, but a superficial crack was still present; 2 c.cm. of A.B.A. was injected as before. On February 12th the fissure had healed; there was no pain or spasm. She was discharged completely healed on February 26th.

Case 4.—A married woman, aged 42. This patient had a chronic dorsal fissure with large sentinel tag and much sphincteric spasm. On March 12th 2 c.cm. of A.B.A. was injected. On March 15th the pain was much less; the sphincter was quite lax, and with a finger a large fibrous polyp in relation to the upper end of the fissure was discovered and readily delivered outside the anus. Novocain was injected at its base, and the polyp excised together with the sentinel tag. On March 26th the anus admitted two fingers readily, and the patient was discharged healed and free from symptoms on April 19th.

To summarize the results: 30 cases from my out-patients' clinic at St. Mark's Hospital and from my private practice have been injected; 18 have been discharged healed, mostly within a period of ten days to three weeks after the injection of A.B.A.; 6 cases remain under treatment. Two cases with indurated fissures were injected with A.B.A., but on further consideration I decided that operation would be more suitable and certain. Finally, 4 cases of recent fissures were injected once, but have not reported for re-examination. So far as I am aware, no patient has had to lie up or discontinue work while under treatment.

CONCLUSIONS.

As an ambulatory treatment for pruritus ani and the subcutaneous injection of anaesthetic solutions in oil, such as benacol and A.B.A., would appear to be safe, of considerable value, and worthy of extended trial.

In the treatment of recent anal fissures the method described can be promised to effect a rapid and brilliant cure, and this early stage is obviously the best for treatment to be undertaken. In fissures of some duration, relief of pain and healing are likely to be obtained in a considerable proportion of cases.

REFERENCE.

¹ F. C. Yeomans, R. V. Gorsch, J. L. Mathesheimer: *Trans. Amer. Proc. Soc.*, 1927.

TREATMENT OF PELVIC INFLAMMATIONS BY DIATHERMY.*

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THE method of treating pelvic inflammations by a diathermy current passed between electrodes placed back and front may or may not be good, but it is not treatment by heating the pelvic contents. If, during a treatment so administered, a thermometer is placed in the cervical canal, no rise of temperature will be recorded. The method to be described in this paper is one in which the pelvic contents are heated by a high-frequency oscillating current, which is applied by means of an electrode introduced into the cervix or urethra.

The treatment of pelvic inflammations by the diathermy current arose, as will be seen later, out of the method of treating gonococcal infections of the cervix and urethra by this current. Diathermy treatment of cervix and urethra for gonococcal infection was founded upon the known fact that the gonococcus is vulnerable to comparatively slight rises of temperature above the normal temperature of the human body, though whether this is the only factor concerned is open to question. It was known that attempts had been made to free the male urethra from gonococcal infection by means of sounds heated by hot water circulating through them. These attempts failed because the sounds would, of course, not heat the tissues immediately underlying the mucous membrane. These deeper tissues can, however, be heated by a diathermy current to some depth, and it was decided to try the effects of heating them in this way.

Dr. E. P. Cumberbatch, in treating arthritis by diathermy of the joints, had observed that those cases which recovered were always due to gonococcal infection, and that there was no such beneficial effect on other cases of arthritis. As a result, attempts were made to rid the cervix and urethra of gonococcal infection by using the diathermy current, and during 1919 I arrived at the method of heating these tissues by means of metal electrodes introduced into their lumen.

The cervix, being insensitive, can be heated to any required temperature without an anaesthetic, but this, of course, is not so in regard to the urethra. An anaesthetic is undesirable because the patients must be treated as out-patients. The temperature at which the sensation of heat changes to pain is 115° F., and the urethra cannot therefore be heated beyond this without an anaesthetic. Moreover, up to this temperature no inflammatory reaction occurs, and, if it is not exceeded, no pain or discomfort follows the treatment. If it is even slightly exceeded some symptom indicating an inflammatory reaction, such as pain on passing water, will occur on the day following the treatment. No harm results until 131° F. is reached. It seems that the reaction to a temperature up to 115° F. does not set up inflammation, but that an inflammatory reaction begins directly this temperature is passed. As it is necessary in cases of gonococcal infection to treat both urethra and cervix at the same sitting, and inflammation following the treatment is to be avoided, the temperature of 115° F. is taken as the maximum allowable.

It was realized that if this temperature was insufficient the method would fail. There are two factors in the production of the lethal effect on the organism—namely, temperature and time. It was determined empirically that this temperature of 115° F. was sufficient if the length of time during which it was maintained was ten minutes. The number of times the process had to be repeated in the case of gonococcal infection was found to vary considerably, but generally six to eight bi-weekly treatments proved to be sufficient.

The technique now used is as follows: An electrode is introduced into the urethra, and by means of the diathermy current the tissues immediately surrounding the electrode

* Abstract of a communication to the Section of Electro-Therapeutics of the Royal Society of Medicine.

are heated to a temperature which is believed to be 115° F. This temperature is estimated by the patient's own sensation, and is the point where the sensation of heat changes to pain. The insensitive cervix is then treated in a similar manner, the current used to produce the temperature in the sensitive urethra being taken as the standard.

This method of freeing the cervix and urethra from gonococcal infection is very successful; it was first practised nine years ago, and up to the present very few cases refractory to it have been met with. Moreover, I found that in cases of gonococcal arthritis it was necessary to treat the cervix only, recovery of the arthritis then taking place. In 1920 I treated with success cases of arthritis not gonococcal in origin but associated with a cervicitis. In cervicitis due to infections other than gonococcal recovery may be procured and erosions healed, though in such cases a greater number of applications may be required.

French writers on the subject of uterine ionization are always very insistent that direct current applications must never be made if there is any inflammation of the uterine appendages. They state, moreover, that pain in the lower abdomen during such direct current treatments is diagnostic of inflammation of the pelvic organs. Up to the year 1921 I was treating by diathermy cases of cervicitis obtained chiefly from a special treatment centre, and it was obvious that cases of salpingitis would sooner or later arrive. I had treated the cervix in this way both to free it from gonococcal infection and for the effects of this procedure on arthritis, and had noticed that pain in the lower abdomen had occurred during the treatment. This occurred in cases in which other signs of salpingitis were absent. No harm had resulted. However, on September 20th, 1921, a patient came for treatment of vaginal discharge accompanied by definite signs and symptoms of salpingitis.

The patient, aged 31, gave a history of vaginal discharge for many months. Signs and symptoms of salpingitis were present. Gonococci were found in smears of the cervix and urethra. The first application of diathermy was given on September 20th, 1921. After this treatment the patient developed pain in the abdomen, with tenderness and rigidity in the right iliac fossa. Vomiting occurred and the temperature rose to 102° F. The patient was admitted to hospital, where she remained two weeks. By October 4th symptoms had subsided and diathermy was resumed. A week later the discharge was decidedly less, but there was still pain in the lower abdomen and tenderness on deep palpation. On October 14th there was no pain or tenderness. On November 7th, although symptoms of salpingitis had subsided, gonococci were found in abundance in the urethra but not in the cervix. On January 16th, 1922, gonococci were found in the cervix but not in the urethra, and, shortly after this date, treatment was resumed. Applications were made on January 24th and 27th. On February 23rd and March 2nd no gonococci were found in the urethra or cervix. On April 4th they were also absent, there was no discharge, her general health was good, and she appeared to have made a complete recovery. She had then remained free from signs and symptoms of salpingitis for six months from the time when they had first subsided.

In view of this experience I determined in such cases to use a milder degree of heating, hoping thereby that a subsidence of the salpingitis might be produced and that the cervicitis might be satisfactorily treated afterwards. I was at this time familiar with the effects on prostatitis due to gonococcal and other infections of diathermy applied to the prostate by means of a metal electrode introduced into the rectum. Subsidence of pain and frequency of micturition, recovery from arthritis and other metastases, and even recovery of the prostate from the infection were remarkably constant.

The intrapelvic electrode I now use is 1 inch in diameter. It is sheathed in vulcanite except for 1½ inches at the end which is to be in contact with the upper end of the vagina. This end must be rounded so as to give an even distribution of the current on account of the tendency high-frequency currents have of coming off at points or edges. The indifferent electrode used at present is a lead belt, 2½ inches wide, made of one pound of lead (gauge 24 S.W.G.) and fastened by a clip, which also serves for an attachment to the machine. With these electrodes a current of two amperes gives a temperature of 106° F. in the tissues in the neighbourhood of the metal part of the vaginal electrode. How quickly the temperature falls off from one electrode to the other is not known, so that the actual

heating of the tubes and ovaries cannot be determined. The treatments last twenty minutes each, and are given twice a week.

The cases about to be tabulated and described were sent for treatment by one of the gynaecologists at St. Bartholomew's Hospital, from Dr. Malcolm Donaldson's department, by Dr. Wilfred Shaw, Mr. Lane Roberts, and Mr. Burt-White, and by Dr. Oldershaw from the Soho Hospital for Women. I am indebted to Dr. Oldershaw for his interest, kindly criticism, and help, and for some of the reports on the late results of the treatment. The total number of patients was 57, but, excluding 4 found unsuitable for treatment, 6 who attended for only one or two treatments, and 6 who received only a short course of treatment, the number may be reduced to 41. Of these, 33 recovered (about 80 per cent.), 6 were partially relieved of their symptoms or relapsed after apparent recovery, and 2 were unrelieved.

When cases are described as recovered it means that:

(1) They are relieved of symptoms connected with the pelvic condition. Many of these patients have been complaining of symptoms for a long time, and their frame of mind is such that recovery from pelvic inflammation is not immediately followed by subjective improvement. Pains, discomfort, or headaches are enlarged upon on inquiry as to their present condition. They are regarded as recovered only if they are relieved of those symptoms which can be referred to pelvic inflammation. (2) Their general health is markedly improved. Instead of having a toxic appearance and being worn out from pain and sleeplessness they have the appearance of health, sleep well, and have improved appetite. (3) Physical signs of pelvic inflammation are absent; examination reveals no swelling which is tender on manipulation. Though there may be some thickening or other abnormality which the examining hand can still detect there is nothing which could be considered sufficient to justify the assertion that recovery has not taken place. In some cases, so far as can be ascertained by inspection and palpation, a complete return to normal has occurred. The appearance of the cervix is normal, and the erosion is healed.

The treatment is safe. No harm has ever resulted, except the acute exacerbation of the symptoms referred to as occurring occasionally when treating the cervix. No patient has died under the treatment, and no operation has become necessary as a result of it.

In the following tables the description of each case is necessarily very brief. Ip. indicates the mild heating by

TABLE I.—*Salpingitis of Undetermined Origin.*

Case No.	Remarks.	Treatment.	Results.
50	Tense, tender mass Douglas's pouch, 3 months	Ip. 3	Pain relieved, still tender, operation.
51	Inflamed left appendages. Duration 2 years	Ip. 10, interval 2 months, Ip. 9	Recovery. Slightly tender nodule in left fornix.
55	Right tube and ovary inflamed, 3 months	Ip. 12	Recovery. Pregnant.
85	Inflamed right ovary and tube, 18 months	Ip. 12	Recovery. Followed one month.
116	Fluctuating swelling. Cervicitis, 18 months	Cerv. 5. Ip. 3	Recovery.
209	Both tubes enlarged, left is tender	Ip. 10	Recovery.
383	Left tube and ovary enlarged and tender	Ip. 10	Recovery.
407	Salpingitis. Cervicitis erosion, 6 to 7 years	Cerv. 4. Ip. 2	Recovery.
441	Salpingitis. Cervicitis erosion, 2 years	Ip. 3. Ions. 11	Recovery.
558	Dry pyosalpinx. Cervicitis, 6 years	Ip. 11	Recovery.
112	Double salpingo-oophoritis	Ip. 5	Recovery.
108	Tender mass right fornix. Cervicitis	Ip. 15. Cerv. 3	Recovery. Subjective symptoms remain.
433	Tender mass both iliac fossae. Cervicitis and erosion	Ip. 5. Cerv. 3. Ip. 5	Recovery. Subjective symptoms remain.
485	Double salpingo-oophoritis. Cervicitis and erosion	Cerv. 2)	Recovery: 9 months later well; 7 months preg.
599	Salpingitis and cervicitis	Ip. 12. Ions. 5	Recovery. Relapse of cervicitis.
160	Swelling right tube, less so left. Cervicitis	Ip. 10. Cerv. 5	Recovery. Followed two months.
528	Cervicitis, subsiding salpingitis, left	Ip. 9. Cerv. 3	Recovery.

the vaginal electrode, and cerv. means that the cervix has been especially treated. The total duration of the course of treatments may be roughly reckoned by remembering that the applications are made twice a week.

In Case 441, healing of the erosion was produced by ionization, which in some cases is more effectual or more rapid than diathermy. Of the seventeen cases, twelve have recovered; one had three treatments only, and the result is inconclusive; three made partial recovery, and one had a relapse of the cervicitis.

TABLE II.—Cases in which *Gonococcus* was Found.

Case No.	Remarks.	Treatment.	Result.
395	Salpingitis. G. found	Cerv. 5	Recovery. Observed six months.
162	Fluctuating swelling. G. found in cervix and urethra	Ip. 1. Cerv. 3. Ip. 6	Recovery. Followed one month. No relapse.
540	Athritis and salpingitis. Aged 8 years	Ip. 8. Per rectum	Recovery. No arthritis, no salpingitis. Followed five months.
165	Appendix. Right tube and ovary removed, tender swelling left fornix	Ip. 5. Cerv. 3	Recovery.
282	Enlarged thyroid and salpingitis. Cervicitis	Ip. 4. Cerv. 8	Recovery. Thyroid not enlarged.
301	General peritonitis 7 months ago with inflammation of tubes and ovaries	Ip. 3. Cerv. 3	Recovery. Followed three months. Five examinations. No <i>Gonococcus</i> found.
223	<i>Gonococcus</i> found in pelvic pus of peritonitis. P. in and tenderness. Rigidity right iliac fossa	Ip. 11	Recovery.

Cases proved to be due to gonococcal infection all made a good recovery after a comparatively short period of treatment. This is nothing more than anyone familiar with the effects of diathermy treatment of gonococcal infections would have predicted, and requires no special treatment.

TABLE III.—Following Confinement.

Case No.	Remarks.	Treatment.	Result.
184	Cervicitis 2 years. Tender swelling left fornix	Cerv. 4. Ip. 12	Recovery.
84	Pain 2 years. Both appendages large and tender	Ip. 11	Recovery.
359	Pain one year. Left salpingo-oöphoritis. Cervicitis. Erosion	Ip. 1. Ions. 9	Recovery.
501	Pain 4 years. Tenderness both iliac fossae. Cervicitis	Ip. 2. Cerv. 7. Ions. 3	Recovery.
168	Bilateral salpingo-oöphoritis	Ip. 8	No improvement.
375	After miscarriage 2 months ago. Swelling right fornix. Cervicitis and erosion	Ip. 5. Cerv. 3. Cerv. 11	Recovery. Relapse of cervicitis after 14 days. Cured.
514	After miscarriage 3 years ago. Swelling left fornix	Ip. 8	Still has pain. Failure.
7	Pain 2 years. Erosion and cervicitis	Cerv. 7	Recovery; 7 months later still recovered.
36	Post-puerperal. Swelling right fornix. Cervicitis	Cerv. 3. Ip. 16	Recovery. Followed one month.
137	Followed miscarriage. Tender swelling left fornix	Cerv. 3. Ip. 11	Recovery; 4 months later well and preg.
210	After confinement 5 years ago. Salpingitis	Ip. 7	Recovery; 5 months later 2 months preg.
295	After confinement one year ago. Salpingitis	Ip. 11	Recovery.

The cases occurring after confinement made a good recovery as a rule; they all had physical signs of salpingo-oöphoritis. Cases 168 and 514 definitely failed to improve after a month's treatment. I have no explanation of why this is so, or in what respect they differed from the rest. In one case (375) the cervicitis and erosion relapsed. The patient appeared recovered on January 6th, 1928, and again on February 21st. She was not seen again till October, when she gave a history of having been cured till the meantime. There was a bright red rim round the cervical os, which returned to normal after a few diathermy treatments. The salpingitis had not relapsed.

TABLE IV.—Parametritis, with Deep Lacerations.

Case No.	Remarks.	Treatment.	Result.
567	Left parametritis. Two years' duration	Cerv. 3. Ip. 6	Recovery.
562	Parametritis	Ip. 4	Recovery incomplete. Was to have attended as an out-patient, but did not do so.

TABLE V.—Following Operation for Ectopic Foetation.

Case No.	Remarks.	Treatment.	Result.
524	Six to seven months after operation	Ip. 3	Relief of symptom. She was to have attended as out-patient, but did not do so.
418	Tenderness and swelling left ovary and tube. Operation 10 years ago	Ip. 8	Recovery.
576	Large hard tender mass low down in Douglas's pouch. After operation 12 months before. Thin, ill and toxic-looking	Ip. many	Small, hard, not tender swelling can still be felt. General health good.

Conclusions.

The cases likely to recover after a comparatively short course of treatment are those of chronic salpingo-oöphoritis without rise of temperature or constitutional disturbance. The pain in one or both iliac fossae may be severe, and there may be a considerable degree of ill health due to pain, sleeplessness, and toxæmia. The presence of pus is not necessarily a contraindication. The chronic pus tube may disappear as far as physical examination goes. Cases are likely to do well if there is evidence of infected cervix with or without erosion, and especially if there are gonococci present.

From the point of view of the effect of treating the cervicitis the figures are very striking. Twenty-five cases have been associated with cervicitis, but one of them received only three treatments. Of the remainder, twenty-two have recovered of the salpingitis, but two of them have had a relapse of the cervicitis. Two recovered as far as physical examination was able to establish the fact, but subjective symptoms remained. If the cases in which cervicitis occurred are included in the failures, we have twenty successes, two failures, and two doubtful successes out of twenty-four cases.

The treatment of gonococcal salpingitis and ovaritis consists in most cases in the treatment of the cervical infection. This applies also to many cases of salpingitis due to infection other than gonococcal. The treatment of the cervix should not as a rule be proceeded with forthwith, but be preceded by a few applications of intrapelvic heating. If treatment of the cervix is undertaken when salpingitis of any degree of severity is present great increase of pain with rigidity of abdominal walls and rise of temperature may result. This condition may last a fortnight, and has occurred in two or three of the cases. No harm has resulted, and the cases have all been eventually cured. It will be noticed from the tables that some of the cases make a rapid recovery even if the symptoms have existed for years. It is probable that 80 per cent. of recoveries would be obtained if gynaecologists chose the cases with a knowledge of what may be expected of the treatment and, while giving a chance to cases on the borderline, exclude those which are obviously unsuitable.

A follow-up of cases treated within the last two years has been carried out by Dr. Simon, and in 80 per cent. of those from whom answers were received recovery was confirmed.

These chronic pelvic infections and inflammations have always presented a difficult problem in gynaecology. I believe that diathermy offers a new method which will avoid a long and tedious period of treatment with swabs, tampons, and douches, will render mutilations unnecessary, and will bring about recovery in some cases in which operation is not likely to succeed.