SOME SUGGESTIONS IN THE TREATMENT
OF PUERPERAL SEPSIS.*

BY

J. R. CAMPBELL CANNEY, M.A., M.D.,

B.CH. CANTAB.,

HONORARY SURGEON IN CHARGE, GYNAECOLOGICAL AND OBSTETRICAL DEPARTMENT,
ADDENBROOKE'S HOSPITAL, CAMBRIDGE.

My plea in this paper is for increased effort in combating puerperal sepsis when and as soon as it appears. Organisms may be present in large or small numbers in fragments of placenta, or membrane, or blood clot, and continue to multiply. Very soon, if not there from the first, they enter the endometrium itself, generally at the placental site or around it, and they soon invade its deeper layers. Thence easy entrance to the muscle wall is afforded by venous and lymphatic channels, the former in or around the placental site containing thrombi which supply an ideal culture medium for further multiplication. If the patient has power to overcome the infection the organisms are gradually destroyed *in situ*; if not, the infection progresses, but unless exceptionally virulent it remains in the uterus for some days. In the presence of infection involution of the uterus is never so rapid as normally, and frequently is arrested altogether. In a patient lying on her back, as is usual for the first few days of the puerperium, the uterus with infection deep in its walls is flabby and bulky from arrested involution and quite unable to drain effectively, partly owing to the patient's position and partly to its lack of contractile power. Any discharge which leaves the uterus will be unable to escape freely unless the patient's position is altered. If the infection is not overcome spontaneously it will soon spread along the various channels open, along the deep veins and lymphatics, along the Fallopian tubes, or into the cellular tissues, and so on, and the organisms will gain the blood stream in varying numbers and produce bacteraemia. Our efforts should be directed, first, to cleaning the inside of the uterus; secondly, to destroying organisms within the uterus; thirdly, to draining a septic cavity; and, lastly, to promoting involution.

My contention is that small, perhaps almost microscopic, pieces of decidua can act as culture media. In a case showing signs of intrauterine sepsis I do not think it matters how complete the placenta, etc., may have been on inspection or to the usual tests, because no one can tell whether minute pieces may not remain. Every effort should be made to remove, with the greatest care and with all possible gentleness, any detritus, however small.

Antiseptics tend to further tissue damage if used strong enough to kill virulent organisms, and therefore provide increased scope for the multiplication of the latter. The efficacy of the new types of antiseptics, such as Dakin's solution, lies not only in the fact that they are used in solutions which are practically isotonic, but that they contain free chlorine, which is a powerful germicide. Their application is continuous, or nearly so, by means of the method described by Carrel and Dakin, modified slightly to suit the structure of the female pelvis. By this means a suitable antiseptic is applied to the infected area, and, what is more, it is continually applied.

Drainage of the infected cavity takes place satisfactorily along the outer walls of the sheaf of Carrel-Dakin tubes as they emerge from the uterus. It is improved by sitting or tilting the patient up in bed and gently washing out the vagina with a simple douche daily. Patients should not only sit up on a bed-pan for evacuation of the bowels, but also upon every occasion upon which the bladder is emptied.

The modified Carrel-Dakin method is as valuable in re-establishing involution as it is in other respects. It will always promote some involution, and it will even do so when the infection has gone beyond the confines of the uterus or even of the pelvis, and when it is going to cause death. One of the most favourable signs, as a general rule, is the expulsion of the tubes about the third or fourth day, and, although it can occur in cases which will eventually prove fatal, it generally shows that a great step towards

recovery has been made. If the infection be so severe that involution does not occur, the tubes will remain indefinitely *in situ*. As further aids I sometimes give ergot, pituitrin, quinine, or digitalis, according to the requirements of the case. This is the basis of treatment immediately sepsis is established, but before describing technique in detail I will briefly mention the treatment I adopt in the later stages of the disease, where the infection has progressed and the patient shows signs of severe bacteraemia.

Soon after peptone shock was advocated for these cases by Dr. Gow I began to use his formula for making the solution and his method of administering it (see *BRITISH MEDICAL JOURNAL*, August 21st, 1920, p. 268). The essentials in giving it are to watch the pulse and the blood pressure and introduce the solution with extreme slowness. Normally it should take from seven to ten minutes to inject 6 to 8 c.cm. The introduction of peptone is usually soon followed by a rigor, but this is a favourable sign. Marked benefit to the temperature and the patient's general state is frequently seen within twenty-four hours. If the high temperature returns or persists, another larger dose is given in two or three days, and so on.

The solution of eusol I have used is, 1 part of the ordinary strength to 5 of normal saline. The injection of 10 to 12 c.cm. intravenously is unattended by the alarming symptoms which may occur with the peptone solution. I have employed it in so few cases that I cannot say of what value it really is. It has, I fear, been rather in the nature of a "last resort" in my cases.

In all cases a culture should be taken from within the uterus with a view to vaccine preparation, but of the use of vaccines I have had very little experience. I understand, however, that generally their use is disappointing. So far blood cultures have without exception proved negative in those cases of mine in which they have been taken. A vaccine prepared from the blood would be expected to be more efficacious than one grown from the endometrium.

Polyvalent antistreptococcal serum has its place in the treatment. There is a tendency for the medical attendant to be content to give one or perhaps two doses at an interval of as long as two days. This is likely to be of no avail. If serum is to be used it must be used frequently and be persevered with. Moderately large doses given every twelve hours for some days will in some cases produce the desired effect.

It is extremely important to make a general examination of the patient, first to exclude any other cause for her symptoms, and secondly to discover the possible presence of lesions secondary to the uterine sepsis—such as pneumonia, pleural effusion, or abscess formation in abdomen or pelvis. The patient is shaved and prepared surgically in the ordinary way, but no douching is done by the nurse. Under anaesthesia she is placed in the perineal position and a copious douche of 1 in 1,500 mercury biniodide given. The vagina is then swabbed dry and painted with a 3 per cent. solution of picric acid in spirit.

An estimate of the size, position, mobility, etc., of the uterus is made by bimanual examination. An Auvard's speculum is introduced and the cervix and vagina carefully inspected for the presence of bruising or lacerations. The os is gently grasped with sponge-holding forceps rather than with a vulsellum, because of its great friability, and a swab culture taken from within. Next, with the greatest care, a finger is introduced and any massive detritus removed. Then with a series of dry swabs of suitable size held by ring forceps the whole cavity is cleaned. A dry swab pushed in and carefully rotated, repeating the manoeuvre several times, will remove tags, small clots, coagulated mucus, and the like. A blunt flushing curette is next used and the whole endometrium gently stroked all over, while a stream of double strength saline continually flows. This removes still more fragments and ensures the retention of nothing which has become detached. I used next to swab out the cavity with flavine, but this I discontinued, as flavine forms a thick coagulum with serum and blood, and so tends to prevent the efficient continuous irrigation of the cavity which is to follow. For a similar reason I have never used flavine through the Carrel's tubes.

The cavity having once more been dried with swabs—or

* Abridgement of a paper read before the Cambridge Medical Society.

packed for a short time if there is bleeding, which usually stops very quickly—a sheaf of four Carrel's tubes is inserted. The tubes are specially designed in order that the whole cavity can be kept in contact with the fluid introduced through them. The tubes are then stitched in pairs to the labia majora by a double looped stitch. Before the patient leaves the table each separate tube is tested for patency (as clotting of blood might rapidly obstruct them) by means of saline driven through them by a Higginson's syringe; they are then firmly tied to the glass leads on the connecting tube. The latter is similarly tested with saline. Pads are placed over the vulva and the connecting tube pinned to the binder. I have found it unnecessary to protect the vulva with grease.

A continuous flow of Dakin's fluid is thenceforward kept up if it can be satisfactorily maintained, but I think a better method is repeated copious injections every two hours. Each twenty-four hours while the tubes remain *in situ* the flushing through with saline is repeated, thus ensuring patency of the tubes.

Once a day a simple vaginal douche is gently given in order to wash away any discharge escaping along the sheaf of tubes. By stitching the tubes in pairs on either side to the labia, the meatus urinarius is not interfered with and patients have no difficulty in emptying the bladder. In the majority of cases temperature soon falls and in a day or two regains the normal. Involution commences soon, as is seen by the sagging of the tubes into the vagina; and their expulsion is usually expected in three or four days.

This modified Carrel-Dakin method is equally applicable to cases when sepsis follows abortion at any stage. The same procedure is gone through, and even greater care is taken to ensure the removal of all detritus, which is generally more adherent. It is sometimes exceedingly hard to remove adherent fragments from the wall of the uterus, especially if only one finger can be introduced. I sometimes use paper-sorting finger caps pulled over my gloves for this purpose, though they tend to blunt the tactile sense.

This is the procedure I now adopt in all cases where there is evident uterine sepsis in the puerperium, whether it appears to be very severe or only quite mild—that is to say, I proceed in exactly the same way when the condition commonly known as "sapræmia" manifests itself. I think active treatment in sapræmia of the greatest importance. So-called "sapræmia" may well be the precursor of true septicaemia, and therefore should never be left untreated. The policy of "waiting to see if the temperature falls in thirty-six hours," or "whether a decomposing piece of placenta will come away of itself," I believe to be wrong. No clear distinction exists in the puerperium between so-called sapræmia and septicaemia, or between septicaemia and pyaemia. In all there is probably a bacteriaemia of varied intensity, and in all there is also circulation in varied amount of toxins the products of bacterial activity. One merges insensibly into the other, and it is quite impossible clinically to say where one ends and the other begins. The tendency in the past has been to regard so-called sapræmia as a comparatively innocuous condition, and as a result there has been the tendency to delay active treatment of it. I maintain that so-called sapræmia (by which is generally meant the presence of putrifying material in the uterus) can at any moment give rise to a septicaemia—namely, deep invasion of the uterine wall followed by liberation into the blood stream of much more toxin and many more micro-organisms. Therefore, sapræmia *must* be dealt with as soon as it shows itself. There is even less distinction between septicaemia and pyaemia clinically, but local treatment at this last stage is not of such importance and has less influence on the future course of the disease.

A class of case I have found to be greatly benefited by the modified Carrel-Dakin treatment is that where some slight sepsis has occurred in the uterus, but has not done any harm till the later weeks of the puerperium. These patients show signs of what might be described as "peritonism"—rigidity, immobility, and tenderness of the abdomen, sudden rise of temperature and pulse, with dryness of the tongue, and so on. In many the symptoms resemble acute appendicitis. If examined by the vagina the uterus is generally found to be larger than would be

expected at the given period of the puerperium, and there is generalized pelvic tenderness with no localizing signs. These are the cases—namely, very early acute salpingitis—where the tendency is to avoid opening the peritoneum if possible. I have treated two such cases with Carrel-Dakin irrigation, with good results. Under anaesthesia the cervix was moderately dilated, some disorganized blood clot removed, and the tubes inserted. Within a very short time the temperature fell to normal, all acute symptoms subsided, and involution was completed almost immediately. Convalescence was in both cases exceedingly short. Gross conditions such as abscess formation and the like must be most carefully excluded, but in those cases where signs of inflammation localized to any given organ are absent, and when the question arises as to the necessity for abdominal section, careful exploration and irrigation of the endometrium may save the patient a major operation and very considerably speed up convalescence. When an abscess forms in the pelvis its evacuation is, of course, necessary, and if with safety it can be opened and drained by colpotomy I think this is the ideal route.

Gross lacerations of soft parts I treat by means of frequent baths made up of weak solutions of borax or Milton solution. Fistulae into the rectum or vagina, or both, after forcible instrumental delivery are less likely to remain permanently open if from the first means are adopted to avoid excretions of the rectum or bladder from escaping continuously into the vagina. In one of my cases, seen by me on the third day, the patient had not only very extensive lacerations of the urethra, but a utero-rectal fistula also—that is to say, faecal matter could be seen escaping from the os, the communication with the rectum being at the level of the internal os through a tear there. With much difficulty the portions of the urethra were found and a catheter stitched into and along them. Similarly a large, thick-walled rubber tube was stitched into the lower four or five inches of the rectum. Meanwhile cleansing of the uterus was achieved by Carrel's tubes, and perfect healing ensued. This patient also had hyperpyrexia, and the symphysis pubis had been wrenched one inch asunder by the instruments. Pyaemic abscess or effusion is treated by incision or tapping. So far I have failed to get cultures of living organisms from these secondary foci.

This paper is based on thirty cases of puerperal sepsis of different kinds which I have treated during the past few years, mostly at the hospital. I regret to say that they are by no means nearly all, but of these I have complete records and charts. Statistics are apt to be misleading, especially in a disease of this kind, because of the extraordinary variability of the factors concerned. This would certainly apply to mortality rate, especially when the number of cases is comparatively small. But one or two points are worth noting when the series is surveyed. In only seven was labour uncomplicated. In all the others there was one or more of the following:

Forceps or manual delivery in 7; manual removal of the placenta in 8; craniotomy in 3; untreated tears of the vagina or cervix in 4; albuminuria in 2; eclampsia in 2; placenta praevia in 2; post-partum haemorrhage in 2; maceration of the foetus and tertiary syphilis in 1.

Thus in half the total number there was intrauterine interference of some sort, not counting the three in which craniotomy was performed. In roughly a third there were conditions characterized by bleeding and consequent anaemia, or toxæmia and consequent debility.

Here, then, we may be said to have two predisposing causes for the occurrence of sepsis—manipulations during delivery on the one hand, and anaemia or debility at or before delivery on the other. Many cases of sepsis are caused by organisms already present in the patient, and in these debility or anaemia is the predisposing factor in lowering the patient's resistance to the action of those organisms. Similarly, manipulations in a patient who already harbours the organisms will provide the damaged tissue upon which those organisms can flourish. In like manner an unstitched tear will act as a predisposing cause, as it is most likely to become mildly septic if communicating with the vagina or cervix, and by its proximity to the uterus act as a potential cause of infection.

It must always be remembered, however, that manipulations of any kind can introduce virulent organisms into the uterus. It is impossible to sterilize absolutely a vagina, however thoroughly it may be attempted, and many virulent organisms can and do exist and multiply there with no harmful results. But if those same organisms gain access to the inside of the uterus they may do untold damage.

Two of my cases were of that most fatal kind, the acute aplastic type of streptococcal infection. Both had been infected with gonorrhoea, and one had subacute gonorrhoea at the time of delivery. She was also hypermature, had a flat pelvis, and required craniotomy into the bargain.

SUMMARY.

1. When fever appears in the puerperium, having excluded maladies outside the pelvis which may cause it, it is far safer to give an anaesthetic and carefully examine the patient's pelvis than to "wait and see." If intra-uterine sepsis is present, explore the uterus and take steps to empty it or clean it, or both. To wait and see if the fever will subside may mean waste of precious time.

2. A so-called sapraemia is quite often the precursor of the most virulent septicaemia, and anyhow a sapraemia will not be improved by leaving even small and removable fragments of placenta or membrane *in situ*, if they are poisoning the patient.

3. The septic uterus will not involute, but the modified Carrel-Dakin treatment, assisted perhaps by drugs, will help involution better (in my opinion) than anything we have at our disposal.

4. If antistreptococcal serum is to be used, use it frequently until the temperature falls.

5. Further adjuncts are "peptone shock" and intravenous eusol.

6. Take a culture from the endometrium and from the blood, as a vaccine later may be of value, especially if prepared from the blood.

7. Pay careful attention to posture in the nursing of these patients. Fowler's position will aid drainage, whereas the supine position will tend to dam back secretions. Similarly micturition and defaecation in a complete sitting position are useful aids.

8. In early infection of the adnexa, the modified Carrel-Dakin method may possibly prevent the necessity of abdominal section, and will certainly speed up recovery.

9. Where anaemia or debility is caused by haemorrhage or toxæmia keep a special look-out for sepsis.

10. Perform all manipulations or instrumentation with extreme gentleness whenever possible, and practise asepsis most punctiliously.

11. Sew up all tears of soft parts immediately.

Puerperal sepsis is a type of wound infection which will not improve by watching and waiting. Operative measures and certain forms of medication have scope, though still limited, in its treatment. There is no panacea, though we hope it may appear. Until it does, each case will require careful study with a view not only to its own cure, but also to the discovery of a real antidote to this scourge.

OCCLUSION OF THE OS FOLLOWING SURGICAL TREATMENT OF UTERINE AND VAGINAL PROLAPSE.

BY

J. NIGEL STARK, M.D., F.R.F.P.S.,

SURGEON, ROYAL SAMARITAN HOSPITAL FOR WOMEN, GLASGOW.

MANY women are compelled to seek relief for the disability and discomfort arising from varying degrees of prolapse of the vaginal walls and uterus. A pessary is the usual means of initial treatment, but often, after a while, it is found necessary to discard it because either it fails to afford sufficient support, or, if it is composed of vulcanite, its pressure upon the soft parts causes pain and irritation. Not infrequently the patient herself becomes impatient and demands more radical treatment, having learned from experience that a pessary, especially a rubber ring, demands

personal attention which becomes irksome as well as several visits annually to or from her medical adviser.

In the event of any of these circumstances occurring surgical treatment can with confidence be advised in the majority of cases. It is now almost universally realized that plastic operations upon the perineum, the vaginal walls, and the cervix of the uterus are sufficient in the great majority of women to afford relief and ensure comfort. The strenuous advocacy for many years of Fothergill and others has resulted in their theories having been accepted and their method of treatment adopted by the great majority of gynaecological surgeons.

As a routine step in the operations, amputation of the cervix is nearly always performed, as it is followed by great benefit in more ways than one. The cervix in conditions of bad prolapse is so often extensively lacerated, eroded, and ulcerated that it is a constant standing source of disease, and, at middle life, a menace as a likely seat of cancer. The purulent discharge which has its origin in such a cervix is a fruitful source of local irritation and discomfort, while the absorption of the toxins is responsible, in my opinion, for much ill health, the prime cause of which is frequently unsuspected. Removal brings about cessation of the discharge, and, in addition, tends to relieve the congestion and to lessen the weight of the generally enlarged and heavy uterus.

Caution, however, must be exercised in the performance of this simple operation, should the patient be of parous age, or her last condition may be worse than her first. I have seen several examples of repeated abortions subsequent to operation, caused without doubt by too high amputation of the cervix, and the following history of the yet more serious consequences which may result from an operation for prolapse in a woman before her menopause seems to be worth recording as a reminder that zeal must always be tempered with discretion.

A multipara, aged 42, who had suffered for several years from a moderate but gradually increasing degree of prolapse, chiefly of the vaginal walls, consulted a well known and esteemed gynaecologist during the absence from home of her usual medical attendant. She was ordered into a nursing home, where, apparently, the operations of anterior and posterior colporrhaphy, amputation of the cervix, and perineorrhaphy were performed, and in two to three weeks she was again at home.

Shortly afterwards attacks of abdominal pain began, at first mild and soon passing away, but gradually becoming more severe until at last they were agonizing enough to call for a hypodermic injection of morphine. Between the attacks the patient was fairly well and was able to go about, but, six months after the operation, she was seized with an attack of such unusual severity that it was considered necessary to have a consultation.

The foregoing history was told to me, and I learned further that menstruation had not appeared since the operation, although it had previously been regular. During the attacks there had never been a rise of temperature. The patient was well coloured and stout. On making a vaginal examination it was found that the operations had successfully effected the formation of a restored perineum and of a normal vaginal canal. The vaginal vault was devoid of any trace of a cervix, its place being taken by a firm cicatrix. Abdominal examination revealed the presence of a tense pyriform swelling, evidently the body of the uterus, rising mesially almost to the umbilical level. Upon questioning the patient the fact was elicited that the pain from which she suffered came spasmodically and reminded her of labour pains.

The diagnosis was apparent, and a day or two later I performed hysterectomy and double salpingectomy. The walls of the uterus were greatly thickened and its cavity contained large quantities of thick blood of a dark brown colour. No trace of the internal os could be found—the cavity was entirely shut off; stenosis was complete. The Fallopian tubes were greatly distended by the same thick chocolate-coloured fluid as was in the interior of the uterus.

No other treatment could have been attempted with any hope of success. Obviously, serious obstacles and dangers which readily occur to one's mind and need not be mentioned would have militated against a good result from any attempt to open up the uterus from below. The patient having children and being 42 years of age, there was all the less objection to hysterectomy being performed. She has remained in good health and has had no pain eight months after the operation.

A too thoroughly radical removal of the cervix in a woman of child-bearing age may therefore be, as this case proves, a dangerous proceeding in the surgical treatment of prolapse, leading to stenosis which may occlude completely the canal at the internal os and so cause retention of menstrual blood.