

Owens College in 1903 on the same subject. He mentioned, among many other points, the fact that the examining standard and the teaching standard are at very different levels in this country, and that a student is unable to properly bring himself up to the height of the former by the thoroughness of the latter. We may hope with him that this is an evolutionary stage of a completely developed system. He quoted from a letter addressed by the Dean of the Owens College to the General Medical Council in 1896 the following suggestions: (1) That the Council insist on three months' attendance at a lying-in hospital; (2) that the practical work should be supervised by a member of the hospital staff; and (3) that certificates of instruction in midwifery should not be received from a private practitioner any more than for clinical medicine or surgery.

These regulations seem to me to be most wise, but, as we know, there has been no attempt on the part of the body addressed to bring any such regulations into force. Sir William Sinclair recommended lying-in wards in general hospitals in default of teaching in lying-in hospitals, and was in agreement with what I have already said in recommending that the student should do his practical work in his final or clinical year.

Dr. John Edgar, the Professor of Midwifery in Anderson's College, Glasgow,¹ has spoken very decidedly on the same lines. He recommends the appointment of a special teacher in midwifery, who shall devote himself entirely to this subject, taking only consulting work outside his hospital duties, pretty much as is done in the German universities. He objects strongly to the certificates of attendance on cases being signed by any medical man other than a teacher of a hospital, and considers that the first six cases should be indoor, the student being drilled in the whole aseptic management of labour.

Surely all the weight of opinion I have adduced, and the discontent which I assert is prevalent among all members of the profession, must lead to something. It only needs the spark to fire the train. It seems to me that we ought not to wait to be shamed into action by pressure from outside, but with the confidence inspired by the successful result of our patient work in improving midwives, we ought seriously and with set purpose to think about setting our own house in order.

REFERENCE.

¹ *Glasgow Medical Journal*, September, 1893.

SOME REMARKS ON PUERPERAL INFECTION.

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THE frequency of severe puerperal infection has shown little diminution during the last forty years, and constitutes a grave reproach to the present practice of midwifery in the British Isles, and indeed all over Europe. During the last twenty-five to thirty years surgical practice has been revolutionized, and infection is almost abolished both in hospitals and in the private practice of surgeons. This cannot be said of midwifery, except in lying-in hospitals where the mortality has been reduced to a minimum. In the five years 1851-5 the puerperal death-rate from all causes was 4.9 per 1,000, and in the five years preceding 1901 it was 4.6 per 1,000. The figures since 1881 are more accurate as a more complete system of registration was then adopted; these, however, show no diminution in the puerperal septic mortality, which still causes over 40 per cent. of all deaths in childbirth, and amounts to 2 per 1,000. Lancashire heads the list with a death-rate of 2.3 per 1,000 from sepsis. This by no means expresses the whole truth, for a much larger number of women suffer from inflammatory pelvic disease after delivery rendering them more or less invalid, and forming a considerable proportion of the patients under treatment at women's hospitals and elsewhere.

This high mortality and morbidity exists in spite of great improvements in sanitation, in our knowledge of the importance of asepsis and the best methods of attaining it, and with the object lesson afforded by maternity hospitals where severe sepsis is practically unknown. A study of the incidence of puerperal sepsis shows that it occurs mainly amongst women confined in their own homes largely attended by midwives and supervised sometimes by medical men. In England and Wales midwives attend 60 per cent. of confinements, and in some districts as many

as 80 per cent. Recent figures published by Dr. Williams in his Milroy Lectures show conclusively that in South Wales infection occurs most frequently among women attended by untrained and ignorant midwives; density of population, climatic influences, and even the presence of zymotic diseases, such as diphtheria and scarlet fever, having little influence in producing puerperal sepsis. It must, however, be acknowledged that puerperal infection is far too frequent in the practice of medical men, especially after complicated and instrumental delivery. Each man should realize his responsibility in attending midwifery, and should spare no effort to control so far as is possible all the factors which if neglected so readily conduce to infection. This is often peculiarly difficult, especially amongst the poor. The doctor is often called in at the last moment, to find possibly an ignorant or meddlesome woman in charge who may have worked much mischief before his arrival. The patient has had no preliminary cleansing; the bed linen and clothing is dirty, the house often insanitary, and conveniences for aseptic measures are wanting. After delivery the principles of nursing are neglected, and the medical man is quite unable to control all the small details so essential to a normal puerperal period. If anything goes wrong he has to bear the odium, and incurs all the responsibility. Midwifery practice under present conditions is certain to be attended by some amount of infection. The insufficient and unskillful attendance provided for women, the necessity for midwives undertaking menial details of nursing, the ignorance and carelessness of women themselves, are all potent causes of infection. Although the vast majority of cases of infection arise in women attended by ignorant midwives, whether a doctor has been in attendance or not, there is still far too much sepsis among patients even of the better classes attended throughout by medical men. The gravity of interference by the hand, or the use of instruments, cannot be too strongly insisted upon. All manipulations in midwifery require those precautions which are taken before a surgical operation, the same attention to detail, and the same care in repairing any injuries which may unavoidably follow. This is possible in almost every case. The essential points are few in number, and largely comprised in the words "surgical cleanliness." The fact that many patients recover in which these measures are not adopted is no argument, especially when we remember the great frequency of puerperal morbidity and its consequences quite apart from the immediate risk to life.

PUERPERAL MORBIDITY.

Although severe infection has been practically abolished in maternity hospitals, patients by no means always progress smoothly to convalescence. The morbidity, that is, the proportion of cases in which a rise of temperature beyond 100.4°F. takes place, varies from 10 to 15 per cent. in even the most perfectly equipped maternity hospitals both in England and on the Continent. Edgar, of New York, in an analysis of 2,300 cases, finds a morbidity of 18.4 per cent. The morbidity rate in 1,000 consecutive cases in the Manchester Maternity Hospital was 11 per cent.; a rise of temperature occurred in 110 cases, a figure which compares favourably with other hospitals. The most recent figures are those of Zweifel, of Leipzig, which show a morbidity excluding pulmonary and other complications of 3.3 per cent. Ahlfeld states that in 8,000 labours in the hospital at Marburg there was only one death from sepsis after natural labour, and in that case the woman had examined herself. In the whole number there were only 20 deaths from sepsis, a percentage of 0.28. Of course, a large number of the cases of puerperal pyrexia are due to causes other than sepsis, such as gastrointestinal disturbances, breast troubles, or some intercurrent affection, but the figures show a great liability to pyrexia in puerperal women, even under the best possible conditions. It is certain that the morbidity rate is very much higher than this in private practice, especially amongst the poor, but it is not possible to obtain exact figures.

ETIOLOGY.

We all now know that puerperal fever is a wound infection, nearly always the result of the introduction of organisms from without. The conditions under which many women are delivered render it at first sight surprising that infection is not more common. Nature, however, has provided very efficient means of protection, and every interference with spontaneous delivery violates these to some extent. The vagina normally contains many bacteria, none of which in health are pathogenic, but probably possess distinct resisting

power to septic organisms. The cervical canal and the uterine cavity are sterile. The amniotic fluid acts as a flushing douche, and after delivery the uterus is firmly contracted, and three to four days after delivery the internal os is almost closed. At the same time the condition of the genital canal renders it very susceptible to wound infection. The vulva is swollen, bruised, and oedematous; the vaginal outlet is relaxed and widely opened for some hours. In primiparæ there is always some laceration of the vaginal orifice. Abrasions and lacerations are very frequent, especially if forceps have been used, and these often escape detection unless a careful examination is made. The cervix is widely dilated, congested, infiltrated with blood and often lacerated. Small clots are very liable to form in the cervical canal and the upper part of the vagina, even after normal delivery. The inner surface of the uterus is reddened, soft and pulpy, with shreds of decidua and small clots adhering to the mouths of the blood vessels. At the placental site the surface is peculiarly uneven, and shows many thrombosed vessels with adherent clots. There is no protecting epithelium in the uterus, and large vessels open close to the surface. Within a few hours of delivery the inner wall of the uterus is covered by a fibrinous exudation. The uterus thus forms a vast and irregular wound surface deprived of epithelium, and presenting many openings of vessels, an area peculiarly favourable to the stagnation and absorption of septic products. At least ten days elapse before the uterine mucosa can be said to be protected from infection, and for nearly three weeks the mucous membrane is very thin and soft, readily becoming an absorbing surface if injured in any way.

BACTERIOLOGY.

The essential feature of the disease is a microbial invasion, and many organisms may produce it. Practically, however, a few only are of the utmost importance.

1. *Streptococcus pyogenes* is the most frequent organism found, and its causal relation to the symptoms is definitely proved. Many varieties exist, and exhibit all degrees of virulence. Thus streptococci may be present in the vagina without producing any symptoms, or they may even invade the uterus, and cause only a mild superficial endometritis. If, however, a fresh invasion takes place from without, a more severe type of infection is produced. This may remain limited to wounds of the perineum or vagina, but commonly the uterine cavity is invaded. The organisms may remain superficial, or rapidly invade the uterine wall or the blood stream, resulting in septicaemia or pyaemia. Streptococcal invasion of the uterus is frequently characterized by the presence of grey membranous exudation over the cervix, readily seen by examination with a speculum. The lochia are usually profuse, haemorrhagic, and not offensive. In the more severe cases they may be diminished or even suppressed.

2. *Staphylococcus pyogenes, albus* and *aureus*, are commonly present in cases of puerperal infection. Very often they are saprophytic, but they may rarely cause severe or even fatal infection.

3. *Bacterium coli commune* is a frequent cause of infection. This is not surprising when we remember how easily contamination may occur from the rectum, and that one decigram of faeces contains 20 million bacilli. The infection is often superficial and characterized by very offensive lochia, often becoming purulent. When the *bacterium coli* is associated with streptococci its virulence is increased, and these "mixed infections" are common.

A few other specific organisms met with in rare cases are the diphtheria bacillus, the tetanus bacillus, bacillus typhosus, etc. There is, however, an important group of organisms which undoubtedly are responsible for many cases of infection—namely, the saprophytic bacteria of the vagina. These are very numerous; some only have been isolated. They are anaërobic and are not pathogenic under normal conditions. If, however, fresh infection is brought from without, or in the presence of dead tissues, such as placenta, clots, or decidua, they may become virulent and cause the so-called "putrid infections" of the uterus.

CLINICAL COURSE.

Puerperal infection is thus the result of invasion by septic organisms from without or by saprophytic bacteria already existing in the genital tract. In the majority of cases the uterine cavity early becomes invaded, although severe and fatal infection may arise from the wounds of the vagina or

perineum. The clinical course of the disease depends upon many factors, namely:

1. The period at which infection occurs.
2. The site of infection.
3. The type of organism and its virulence.
4. The local conditions present in the uterus.
5. The resisting power of the individual.

On all these points our information is very incomplete, and consequently the clinical progress of the disease cannot be foretold with any degree of precision.

Great importance is rightly attached to the bacteriological diagnosis, and much labour has been devoted to this question. A glass tube may readily be introduced into the uterine cavity, the cervix being previously exposed by a speculum, and a specimen of the uterine secretion taken by means of suction with a syringe. The tube can then be sealed and sent to the laboratory. The secretion is examined by cover-glass preparations and by cultures, but a full report cannot be obtained in less than thirty-six to forty-eight hours. Our knowledge of the bacteriology is far from complete, but certain conclusions may be definitely formulated, and these have an important bearing on the treatment.

1. The uterine cavity is sterile during the first week in normal cases. After the seventh day organisms are often found, but rarely possess pathological importance. If, however, the lochia are sterile some other source for the pyrexia must be sought, such as wounds of the vagina or perineum or some extrauterine affection.

2. If the lochia contains streptococci a diagnosis of streptococcal infection may be made. We have, however, no means of estimating the gravity of the infection or the depth of invasion. No fewer than nine varieties of streptococci have been isolated from the uterus; some of these are not pathogenic, and the recognition of the type present is difficult and cannot be relied upon clinically. In many cases streptococcal endometritis remains superficial, and a leucocytic exudation is thrown out in the uterine mucosa, which prevents further spread of infection. The lochial discharge is often profuse, becoming purulent in a few days. In severe cases it may be scanty or suppressed, but the discharge is never offensive in pure streptococcal infection.

3. If the *staphylococcus pyogenes aureus* or *albus* is present, these organisms may be the cause of infection. They are often found associated with streptococci, and as in cultures the staphylococci grow more rapidly, the former may escape observation unless great care is taken. Staphylococci are often saprophytic and of little pathological significance.

4. The *bacterium coli commune* may be found in the lochia, which is usually profuse and offensive. These organisms possess very definite invasive power, and have been seen in the vaginal walls and the thrombi at the placental site. They do not invade the blood stream, but enter the lymphatics, producing metro-lymphangitis and peritonitis.

5. If anaërobic bacteria only are discovered the case is one of "putrid" endometritis. This is often associated with decomposition of clots, placenta or decidua, and these cases have been regarded as "sæpraemia or absorptive fever." It has, however, been definitely proved that these organisms are capable of producing generalized infection even in the absence of pyogenic bacteria. If, however, these are present, such as the streptococcus or *bacterium coli*, the synthesis greatly increases the intensity of infection. A streptococcus of little virulence may thus become very dangerous if associated with putrefactive bacteria.

Putrid infection of the uterus may occur in various ways:

(a) As an infection of the amniotic fluid commencing before delivery.

(b) As an infection of the placenta, especially after abortion.

(c) As an infection of the decidua and blood clot *in utero* after delivery.

(d) As gaseous septicaemia; large quantities of gas developing in the uterus.

(e) As an abscess of the uterus or infection of a myoma.

(f) As gangrene of the uterus or dissecting metritis.

Putrid infection of the uterus may arise from the anaërobic organisms present before delivery, but these are nearly always associated with aerobic bacteria introduced from without, especially the colon bacillus or the streptococcus. Under such circumstances these bacteria become very virulent, invading the uterine wall and reaching the peritoneal investment of the uterus, causing a generalized infection (Varnier,

Jeannin). All recent research shows that the old distinction between sapraemia and septicaemic infection cannot be maintained. Pure sapraemia or "absorptive fever" is probably rare, and may readily develop into fatal septicaemia unless the early and complete removal of all infective material from the uterus is effected.

Sources of Infection.—The possible modes of infection of the puerperal woman are numerous, and no useful purpose would be served by a categorical list. The entrance of organisms from the vulva and perineum, which swarms with pathogenic bacteria, is readily effected by the introduction of the hand, instruments, etc., even if these are sterile. Soiled bed-linen, dirty garments, and the accumulation of discharges around the vulva and perineum are frequent causes of infection, and the risk is much increased if abrasions or lacerations are present. The formation of clots in the vagina forms an eminently suitable medium for rapid growth of saprophytic bacteria whose virulence is increased by invasion from without. Zweifel has recently obtained a large reduction in his morbidity by carefully removing vaginal clots on the second or third day. These he finds to be almost invariably present even in normal cases. Insanitary conditions, foul air, overcrowding, etc., must be regarded mainly as predisposing to infection by lowering the general health. Many other factors tend to render the puerperal woman peculiarly susceptible, such as the exhaustion of a long labour, the loss of blood, exposure to cold, and mental disturbance; but it must be clearly realized that the essential element is a microbial invasion from without, or, in rare cases, from the genital canal itself.

Autogenetic Infection.

This may occur as "absorptive fever" from decomposition of clots, decidua, or placenta, since the organisms present in the normal vagina are identical with those of "putrid" infections, and all that is necessary is that they should enter the uterine cavity by continuity of blood clot or retained products. In the great majority of these cases the infection is "mixed," due to bacterial invasion from without. Gonorrhoea at the time of delivery may cause an infection which may be considered "autogenetic," and this disease is certainly a cause of puerperal infection. Some years ago I analysed 50 cases in which the vagina was infected by gonorrhoea at the time of delivery, as shown by the development of acute purulent ophthalmia in the infant.¹ Sixty per cent. of the patients recovered without any complication. In 40 per cent. more or less acute inflammation of the pelvic organs occurred. In the majority of cases purulent endometritis with pyrexia was present, and in 10 per cent. acute pelvic peritonitis followed. All these patients recovered. Rarer complications are acute pelvic cellulitis, or abscess of the uterine wall. Three cases in the series died of general septicaemia, but in each the infection was a mixed one, streptococci being present. The prognosis of pure gonorrhoeal puerperal infection is favourable as to life, and many cases make complete recoveries, and bear children afterwards. Autogenetic infection may also arise in rare cases from the recrudescence of an old focus of inflammation or suppuration in the pelvis, such as a pyosalpinx, abscess of the ovary, or appendicular abscess. Mention must also be made of suppurating ovarian cysts and necrotic myomata causing septic symptoms after delivery.

EARLY SYMPTOMS AND DIAGNOSIS.

The prompt recognition of infection is most important, as at this time suitable treatment may radically change the course of the disease. The early signs are few but definite, and if a thorough investigation is made errors are not likely to arise. Almost all cases commence as a local infection, although exceptionally generalization may occur within a few hours. The disease remains local in the generative tract for two or three days, or longer. Experiments made on animals as to the speed at which streptococci may invade the tissues are misleading if applied to the human uterus.

1. *Rise of Temperature.*—If the infection is conveyed during labour, the temperature is usually raised within forty-eight hours. This may at first be slight and escape notice, unless careful records are kept. On the third or fourth day a sudden accession of fever, often accompanied by a rigor, occurs. Pyrexia coming on after the fourth or fifth day—the temperature having been up to this time absolutely normal—points to a bacterial invasion after delivery, and is often due to a "mixed" infection of saprophytic vaginal bacteria associated with streptococci or the bacterium coli commune introduced from without. Rises of temperature due to constipation, tension in the breasts, mental emotion, or some intercurrent

disease, occur with special frequency in the puerperium. These must be carefully differentiated, and are unassociated with the other characteristics of infection.

2. *Increase of Pulse-rate.*—This occurs early, and the rise is usually out of proportion to the degree of pyrexia. Thus a temperature of 102° should usually be associated with a pulse-rate of 97; temperature of 104°, with pulse-rate of 105 (Liebermeister). In puerperal infection the pulse-rate is increased much beyond this ratio; a pulse of 120 to 130 is often present, and forms a reliable guide as to the severity of the disease.

3. *Delayed Involution of the Uterus.*—This is characteristic of infection of the uterine cavity, and is often accompanied by tenderness on pressure. Examination reveals that the cervix is soft, the canal widely open, and the internal os is patulous, readily admitting the finger. Special stress is laid on this last point by Budin, who regards it as characteristic of infection if present after the fourth day. Examination with a speculum reveals greyish exudation over the vaginal portion of the cervix and spreading upwards into the canal.

Changes in the Lochia.—These are not uniform. The uterine discharge may appear normal and yet contain streptococci. The lochia are often profuse, but in the severe cases they are scanty or even suppressed. Much weight has been attached to an offensive smell as a sign of infection. This is present in putrid endometritis or bacterium coli commune infections, especially if clots or placenta are retained *in utero*. In pure streptococcal infection there is no decomposition of the lochia. Profuse purulent discharge is characteristic of gonorrhoeal endometritis and the later stages of streptococcal infection.

The only reliable method of investigating the lochia is the bacteriological one, and this should, as far as possible, be adopted. The later symptoms depend on many factors to which reference has already been made, and which we are not able to estimate accurately. Consequently the prognosis must always be guarded. It is computed that if all cases of pyrexia due to infection be included, the mortality would not be more than 10 per cent. In the severe types the risk to life is much greater; probably 30 per cent. are fatal. The uterus may be the seat of a putrid or septic endometritis which remains superficial, the further progress of the organisms, being checked by the leucocytic protecting zone developed in the deeper layers of the endometrium, or the infection may extend into the body of the uterus through the blood vessels or lymphatics or along the Fallopian tubes.

TREATMENT.

There is a general arrangement as to methods of prevention, and also as to the necessity for supporting measures to maintain the strength in cases of puerperal sepsis, but grave differences of opinion still exist as to the best methods of local treatment. In the majority of cases the disease is local at first, often commencing in the perineum or vagina, the uterine cavity being secondarily infected. It is not necessary to immediately explore the uterus in every case of mild infection. This, if done indiscriminately, may easily convert a slight infection into a severe one. A careful local examination of the perineum and vagina should always be made. If there is evidence of infection, all sutures should be removed and vaginal douches instituted. The cervix should also be examined by a speculum. If it is covered with grey exudation and the uterus is bulky and tender, it is almost certain that the uterus is infected.

So many methods have been adopted in the treatment of the uterus that it may conduce to clearness if the method I adopt is described shortly. It is based upon notes of 120 cases:

1. A rise of temperature of 101°, not accounted for by other causes, renders a careful examination of the generative tract necessary.

2. If no sufficient cause is found in the vagina or perineum, and if the uterus is bulky and tender, a specimen of the lochia is removed and a uterine douche given with due precautions. In 48 consecutive cases observed in hospital this was sufficient in 30 per cent. to bring down the temperature rapidly to normal. For some years I have supplemented this by carefully swabbing the interior of the uterus by absorbent wool soaked in a solution of biniodide of mercury in alcohol (1 in 2,000). This removes shreds of tissue and blood clot.

3. If this procedure is inefficient, or if the infection is of a severe type from the first, the uterus is explored with the fingers, preferably under chloroform. If the cavity is perfectly smooth, showing an absence of retained products or decidua—a condition which is rare—the uterus should be

thoroughly swabbed out with the biniodide in alcohol or some strong antiseptic solution, and packed with iodoform gauze soaked in an antiseptic. If a definite piece of placenta is found, this, together with blood clots, should be taken away, followed by swabbing and gauze packing. If the cavity is large and the surface irregular, due to hypertrophied and necrotic decidua, the patient's safety can only be ensured by its complete removal. There is no doubt that this is most efficiently done by the use of a suitable curette. The fingers alone cannot effect a complete removal of all placental and decidua tissue, especially if it is firmly adherent.

Curetage.

The most divergent views have been held as to the place of the curette in the puerperal uterus. The modern tendency is to restrict its use, and many entirely reject it. In Germany the curette is almost given up, and local treatment is restricted to swabbing and packing the uterus with gauze soaked in absolute alcohol or some non-toxic antiseptic. In France, on the other hand, Pinard, Doléris, and others are strong advocates of early and thorough curettage in all cases of uterine infection. They insist on the importance of early operation with the object of disinfecting the uterus by removal of all necrotic tissue, including the superficial part of the decidua mucosa, which, if not already infected, will speedily become so. The results in skilled hands show that curettage is innocuous if carried out before the bacterial invasion has extended into the walls of the uterus. In septic infection of the endometrium, and if the organisms have already invaded the lymphatics and blood vessels, the results of any method of local treatment are uncertain. We possess, however, no clinical means of ascertaining the depth or degree of invasion, and many patients who show all the signs of septic infection manifest the most striking improvement after curettage skilfully performed. Very grave toxæmia may be produced by a superficial streptococcal invasion of the endometrium.

The arguments against curettage are: (1) The difficulty of thoroughly going over the whole interior of the uterus; (2) the danger of perforation; (3) that the finger can be used equally well to remove retained products; (4) that the curette may cause generalization of a local infection either by removing the leucocyte protective zone which is thrown out by the uterine wall to prevent the spread of infection, or by opening up the mouths of vessels and lymphatics which become the site of fresh inoculation. Curettage of the puerperal uterus is a serious operation, and it is difficult to carry out thoroughly; if badly done it is distinctly harmful. The cavity of the uterus is large, and unless it is gone over systematically much of the infected decidua will be left behind. Haemorrhage may be very free owing to atony of the uterine muscle. It is very desirable that a method of treatment should be devised which is efficient and yet absolutely safe. The "écouvillon" or brush curette of Budin and Doléris effects a very complete removal of retained products and necrotic decidua. This instrument resembles a bottle brush, but is made of strong quills. It is used to scrub the interior of the uterus by vertical and rotary movements. All débris is then removed, and the cavity is left quite smooth. A douche is then given and the uterus firmly packed with gauze soaked in alcohol or some strong antiseptic. It is essential to give chloroform, as it is a painful process, and dilatation of the cervix may be required. The results are excellent if carried out at any early period of the disease, and this plan of treatment is worthy of more general adoption. There is general agreement that in certain types of infection all vigorous local treatment is harmful. Such are (1) general septicaemia with evidence of septic phlebitis or infiltration of the pelvic connective tissue; (2) peritonitis or inflammation of the appendages, except as a preliminary to some surgical operation such as drainage of the posterior *cul-de-sac*; (3) gonorrhoeal endometritis: these cases usually recover, unless a "mixed" infection is present. If curettage is thoroughly carried out it is rarely necessary to repeat it. If the operation has been of marked benefit and the symptoms recur it may be repeated, but usually uterine douches or gauze packing are quite sufficient. If no good result follows little is to be done by further intrauterine treatment. Careful watch must be kept for evidence of localization of inflammatory products.

Posterior Vaginal Section.

This operation may be carried out as supplementary to curettage if symptoms of pelvic peritonitis are present. The finger is introduced into the peritoneal cavity, any fluid

evacuated and drainage by a tube or gauze packing established. This procedure is free from danger, and in some cases is remarkably successful in checking the infective process.

Hysterectomy.

This operation has been performed in 137 published cases with a mortality of 63 per cent.² It has been done for the most diverse conditions, and its value and limitations can only be gauged after a complete study of the cases in detail.

It has been conclusively shown that the operation in cases of puerperal septicaemia, without localization of the infection, is most dangerous, the mortality amounting to 70 per cent., and it is probable that some which recovered would have had an equally good chance without the operation. If the uterus contains placenta or débris accompanied by grave infection, hysterectomy is much more dangerous than curettage and packing, and should never be done. The best results have been obtained in cases of peri-uterine suppuration, gangrene of the uterus, or necrotic myomata, but these rarely arise in the early days of the puerperium. The symptoms of infection do not afford any reliable guide as to when to operate in acute cases, and in these the operation is very fatal and should not be performed.

Use of Antistreptococcal Serum.

This has now been before the profession for ten years, yet there is no general agreement as to its value in puerperal septicaemia. This is due to various reasons: the enormous variability of puerperal infection; the different kinds of serum used; the rarity of complete bacteriological investigation. It is quite unscientific to use serum unless streptococci are actually the cause of infection. We know now that many varieties exist, and a serum potent against one type may be useless against others. A "polyvalent" serum has recently been introduced to meet this difficulty, but it is too early as yet to define its value.

The following conclusions may be stated:

1. The serum is innocuous if carefully prepared and injected with due precaution.
2. It must be administered early in the disease and in large doses—20 c.cm. twice or thrice in twenty-four hours in severe cases.
3. If administered early and in large doses definite improvement is observed in a considerable proportion of cases.
4. All statistics are valueless unless accompanied by bacteriological details.

The most recent work on the subject has been done by Bumm,³ who is a strong advocate for the use of serum. In each case a bacteriological examination was made. He used it in 53 cases of streptococcal endometritis, 32 of which were severe, the blood containing streptococci in 17 cases. In 21—that is, 35 per cent.—the serum had a definite effect, as shown by fall in pulse and temperature; in 17 it was useless. Five patients died. In septic peritonitis and in endocarditis the serum had no effect. The serum was given in 3 cases of septicaemia, the blood being loaded with streptococci; in 2 cases the serum had no effect; 1 case recovered with thrombosis of the iliac vein.

It would seem, therefore, that serum should be given in all severe infections, and that it is of real value in a certain proportion of cases.

REFERENCES.

- ¹ *Trans. North of England Gyn. Soc.*, 1895.
- ² Christeanu, *Rev. de Gynéc.*, July-August, 1904.
- ³ *Munch. med. Woch.*, September, 1904.

THE INCREASING USE OF LEAD AS AN ABORTIFACIENT;

A SERIES OF THIRTY CASES OF PLUMBISM.*

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THE ecobolic properties of lead have been well known to the medical profession for a very long time, and every textbook dealing with the subject of plumbism refers to the frequency with which females suffering from this affection tend to abort. The idea of using this drug primarily as an abortifacient would never occur to any one having any medical knowledge; it would resemble too closely the Chinaman's method of obtaining roast pig by burning down the pigsty.

* Read before the Yorkshire Branch of the British Medical Association at Bradford, January, 1905.