**Puerperal infection considered from a bacteriological point of view : with special reference to the question of auto-infection / by J. Whitridge Williams.**

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# PUERPERAL INFECTION CONSIDERED FROM A BACTERIOLOGICAL POINT OF VIEW, WITH SPECIAL REFERENCE TO THE QUESTION OF AUTO-INFECTION.[1]

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To Ignaz Semmelweiss is due the credit for having rescued the puerperal diseases from the realm of hypothesis and theory, and for demonstrating that in the vast majority of cases they are due to infection from without, and thus placing them, to a greater or less degree, within the category of preventable affections.

His great services were not at first appreciated, and not until the introduction of antiseptic methods into surgery did they receive the attention which they merited. With the advances in anti- and a-septic surgery, however, it was found that his views were based upon sound observation and were entitled to the greatest possible consideration; so that now he is justly regarded as the father of antiseptic midwifery, and his name will go down with that of Lister as one of the great benefactors of mankind. At present, so great is the admiration in which he is held that steps have recently been taken to raise an international fund for building a monument in his honor in Budapest, his birthplace.

With the advances in bacteriology, and the increasing knowledge of the relations which micro-organisms bear to suppuration and septic disturbances, it has gradually been established that the puerpeal affections do not represent a class of diseases *sui generis*, but are identical with the affections which follow the infection of wounds in other parts of the body, and are due to the same micro-organisms; in other words, puerperal infection is wound infection.

By a long series of observations it has gradually been established that most of the fatal cases of puerperal disease have been due to infection with the streptococcus pyogenes. Before the employment of cultural methods for isolating micro-organisms various observers found chains of micrococci in the tissues of various organs of women dead of puerperal fever. Mayrhofer,[35] in 1865, was the first to publish such an observa-

[1] Read before the Medical and Chirurgical Faculty of Maryland, April, 1893.

tion, and was rapidly followed by others, among whom may be mentioned Rindfleisch,[43] Coze and Feltz,[9] Recklinghausen, [42] Waldeyer,[51] Klebs,[29] Orth,[39] Heiberg,[22] Landau,[32] Spillman,[47] Doléris,[14] and others.

Pasteur,[41] in 1880, was the first to cultivate the streptococcus from the organs of women dead of puerperal fever. Similar results were likewise obtained by Fränkel,[18] Iovanovic,[24] Lomer,[34] Winckel,[54] Bumm,[5] Döderlein,[11] Winter,[55] Ott,[40] Czerniewski,[10] Widal,[53] and others, so that at present there can be no doubt that the streptococcus pyogenes stands in a causal relation to a very large proportion of the fatal cases of puerperal disease. One of the most convincing articles upon this subject was written by Widal,[53] who found streptococci in nearly every case in which he performed an autopsy, and who was able to demonstrate that the most divergent forms of puerperal affections, as puerperal ulcers, endometritis, parametritis, peritonitis, septicæmia, pyæmia, and even phlegmasia alba dolens, could all be traced to the same cause; namely, streptococcus infection.

Streptococci are not, however, always the sole cause of puerperal diseases, for, just as various other organisms may lead to wound infection and sepsis in other portions of the body, so may they also give rise to puerperal wound infection.

Thus, Brieger[4] was the first to show that the staphylococcus might cause fatal puerperal fever, and his statements were soon verified by Czerniewski,[10] Fehling,[15] Hägler,[21] Döderlein,[12] and others. Staphylococci do not, however, frequently cause the more severe forms of the disease, but it is generally admitted that they frequently give rise to mild cases, as was first pointed out by Hägler,[21] an assistant to Fehling.

Not infrequently staphylococci are combined with streptococci in these affections. Döderlein[12] reported a small epidemic, which occurred in Leipzig in 1887, which was due to a combination of these two forms of organisms.

In a certain number of cases the organisms of putrefaction are supposed to play a part in the production of puerperal affections, not so much by their action as pus-producers as by the absorption of poisonous ptomaïnes, which are the result of their life processes. This is the class of cases which Matthews Duncan designated as sapræmia, and with which most of us consider ourselves familiar.

To us, however, it is doubtful whether they are of as frequent occurrence as is generally supposed, and we do not hesitate to believe that a considerable number of the so-called cases of sapræmia are not due to the putrefactive organisms at all, but are the result of slight infection with the ordinary pus producing organisms. We are strengthened in this belief by the statement of Bumm[7] (1891), who found streptococci lacking in only three out of eleven cases, which appeared clinically to be typical cases of putrid endometritis. And very lately (1893), Von

Franque,[19] in a clinically typical case of sapræmia, found only a pure culture of streptococci in the retained lochia. Supported by several similar observations, he concludes his article with the following sentence: "The occurrence of sapræmia in the puerperium is rare; it should only be diagnosed when an accurate bacteriological examination of the lochia demonstrates the absence of pathogenic and the presence of saprophytic organisms."

We do not desire to be understood as stating that there is no such thing as sapræmia; for as yet we are unable to express a positive opinion upon the subject.

Gonococci are occasionally the cause of some of the milder cases of puerperal disease. For years this has been a favorite theory with Sänger and many others, and within the last few months it has been clearly demonstrated that such may be the case. For in the *Centralblatt für Gynäkologie* of February 25, 1893, Krönig[30] makes a preliminary communication on "Gonorrhœa in Wochenbett," in which he states that he has obtained a pure culture of the gonococcus from the interior of the uterus, in nine cases in which there were slight febrile disturbances during the puerperium. He further states that all the cases recovered without treatment. There can be no doubt as to the correctness of Krönig's[30] statements, for he is an assistant in the Gynecological Clinic at Leipzig, and no doubt his work was done under the supervision of Döderlein, who is an expert bacteriologist as well as obstetrician.

Von Franque,[19] in his recent article, reports a case of puerperal infection of moderate severity, in which he found a pure culture of the colon bacillus in the uterus, unaccompanied by any other organism. That the organism was virulent was shown by the fact that the pure culture readily killed guinea-pigs and rabbits.

As far as we can learn, this is the first instance in which the colon bacillus has been said to be the cause of puerperal infection; but when we consider the proximity of the genital tract to the rectum, where colon bacilli abound, we should not be surprised at Von Franque's find; but rather that the same organisms have not been found in the uterus in other cases.

That still other organisms may occasionally lead to puerperal infection is extremely probable. Kuliscioff[31] states that he believes that eventually the bacillus proteus will be considered as a cause for puerperal infection. His statements, however, have not yet been verified; but we are quite prepared to believe that the bacillus proteus may give rise to these troubles; for we have seen a case of fatal peritonitis (Flexner[17]), as well as an ovarian abscess caused by it.

That still other organisms may play a part in these processes is rendered quite likely by the statement of Witte,[56] who has isolated five

varieties of bacilli from the vagina, all of which are found to be pathogenic for rabbits.

Very lately (April 6, 1893), in a fatal case of puerperal tetanus, Heyse[23] has succeeded in demonstrating tetanus bacilli in the cervical secretion obtained during life. In this case forceps had been employed and the placenta extracted manually. The demonstration of tetanus bacilli in the dust obtained from the cracks between the boards of the floor of the room in which the woman had been delivered, renders it most probable that the woman was infected by the accoucheur.

Heyse's case is very thoroughly worked out and is of great interest in connection with the facts already adduced.

To resume. We will state that scientific proof has been adduced which demonstrates that puerperal infection may be due to the invasion of the wounds of the genital tract by the streptococcus pyogenes, the staphylococcus aureus and albus, the gonococcus, and the colon bacillus. It is quite probable that some of the putrefactive organisms play an important part in the production of sapræmia, and it is possible that the bacillus proteus, and perhaps other organisms, may be capable of giving rise to puerperal infection.

Thus we see that various, very diverse micro-organisms, especially the streptococcus and staphylococcus, may give rise to puerperal infection, and that the organisms concerned are identical with those connected with the usual forms of wound infection. (See Welch: "Conditions Underlying the Infection of Wounds," THE AMER. JOURN. OF THE MED. SCIENCES, November, 1891.)

We have thus briefly indicated the various organisms which may be concerned in puerperal wound infection, and at the present time no one will deny that in the vast majority of cases the offending micro-organisms are brought to the woman from without by hands or instruments which are introduced into her genital tract; in other words, that we have to deal with direct wound infection, just as well as the surgeon.

Semmelweiss[45] recognized this fact nearly forty years ago, when he said: "The decomposed organic-animal material which causes childbed fever when absorbed, in the vast majority of cases is brought to the individual from without. These are the cases which represent the epidemics of childbed fever; these are the cases which can be prevented." And at the present day the only change which one could make in Semmelweiss' statement would be to substitute the words pathogenic micro-organisms for "decomposed organic-animal material."

The question now presents itself: Is external infection the only cause of puerperal infection? Must the obstetrician attribute every case of puerperal infection to the effect of organisms, which he himself has introduced into the woman's genital tract? Or can he say in a certain number of cases that the infection is due to no fault on his part, but rather

to conditions which existed within the genital tract prior to his examination?

In other words, is there such a thing as auto-infection?

Semmelweiss[45] said there was, in the following sentence: "In rare cases the decomposed organic-animal material which causes childbed fever when absorbed, is produced within the borders of the affected organism; these are cases of auto-infection and cannot all be prevented."

We now know that all wound infections are due to micro-organisms, which must be introduced from without, for they cannot originate independently within the body; consequently auto-infection, as conceived by Semmelweiss,[46] cannot exist.

In the first flood of the rigid antiseptic era, the possibility of auto-infection was generally denied, and for a time all puerperal troubles were attributed to external infection. This state of affairs continued for some time, but gradually obstetricians found, in spite of what they considered most rigid antiseptic precautions, that they did not have ideal puerperia, and that puerperal fever was not absolutely abolished, and although they treated the lying-in woman as they would a severe surgical case, they did not have so good results as the surgeons.

To explain the difference between the ideal puerperium and the imperfect results attained, Ahlfeld,[1] of Marburg, rehabilitated the auto-infection idea. He took the most extreme views as to the frequency of auto-infection and included under that term many cases in which there could be no reasonable doubt of external infection.

Ever since then the subject has been constantly before the obstetrical world, and all varieties of arguments have been advanced both for and against it, and considerable temper not infrequently displayed.

The fact of the matter is that the term auto-infection is an unhappy one, and the entire discussion has been one more of words than facts; for neither side has been able to give a perfectly clear definition of what they mean by the term, and consequently, in any discussion, the opposing sides have no common ground upon which to stand.

The question as to the possibility of auto-infection, accordingly, resolves itself simply into a consideration of the definition of the term.

From what has been said above there can be no hesitation in denying the possibility of auto-infection as conceived by Semmelweiss.[45]

On the other hand, it is quite possible that pathogenic organisms may exist in the genital tract during pregnancy without giving rise to any symptoms whatever, and only exert their influence during labor or the puerperium, when the wounds which follow labor will afford abundant opportunity for their absorption. This, of course, is only a variety of external infection, the only difference between it and the usual form of contact infection being the length of time that the offending micro-organisms have been in the genital tract; in other words, we have to

deal with direct and indirect infection. Thus, for example, admitting that the vagina may contain pathogenic organisms, it is conceivable that they may lead to infection, without any further introduction of organisms from without.

This is practically the definition given by Kaltenbach [25] at the German Gynecological Society in 1888, and is what we understand by the term auto-infection.

Regarded from this standpoint, therefore, the possibility of auto-infection must stand or fall with the demonstration of pathogenic organisms within the genital tract of pregnant women who have not been examined. Can it be shown that pathogenic organisms are present under these conditions?

Kehrer,[28] Karewski,[27] and others of the earlier observers stated that the lochia of healthy women always contained substances which were capable of producing suppuration when injected into animals, and also that their virulence increased with the length of time after the labor.

From this they concluded that it was always possible for a woman to be infected from her own lochia, and the only reason that it did not occur more frequently was that the wounds resulting from the labor had healed before the lochia had time to attain their greatest virulence This work was done without the most approved aseptic precautions, and is therefore of practically no value.

As the methods of bacteriological research became more perfected, a number of investigators busied themselves with this question, and at first their results were very contradictory.

Gönner[20] (1887) examined the vaginal and cervical secretions from 31 healthy women, and found pathogenic organisms in none of them; he accordingly stated that in healthy women the vagina contained large quantities of non-pathogenic organisms, from which, however, there was absolutely no danger of auto-infection.

He was soon followed by Döderlein,[11] who obtained the lochia directly from the uterus, and found in non-febrile cases that they were free from micro-organisms; while in febrile cases they contained large quantities of organisms, usually streptococci; the vagina always containing numberless germs of the most various species.

The next year (1888) Winter[55] examined the uterine secretions in non-pregnant women, and concluded that they were free from micro-organisms, but that the vagina and cervix contained many varieties. In one-half of his cases he found the staphylococcus albus in the vagina; in all, he cultivated twenty-seven different varieties of organisms from the vaginal secretion, including all varieties of strepto- and staphylococci. His work substantiated that of Döderlein,[11] and both agreed that the character of the vaginal secretion afforded abundant opportunity for auto-infection.

Ott[40] was likewise able to confirm the statements of Döderlein[11] and Winter[55] as to the absence of organisms from the interior of the uterus; but he also stated that in healthy puerpera the lochia from the upper portions of the vagina were free from organisms, and consequently could not offer an opportunity for auto-infection. In fever cases, on the contrary, he found various organisms in the lochia whether obtained from the uterus or vagina.

Czerniewski[10] examined the uterine lochia from 57 lying-in women with, and 77 without fever. In only one woman without fever could he find organisms in the uterus; while in all the fever cases he found large quantities of organisms, principally streptococci, most of which were proved to be virulent.

It is evident, from the work to which we have just referred, that all the investigators in this field agree in stating that the interior of the uterus in healthy women, whether in the normal or puerperal state, is absolutely free from micro-organisms; while in febrile puerperal cases they are always present and are usually streptococci. Work by Strauss and Sanchez-Toledo,[49] upon the lower animals, has also demonstrated that the healthy uterus is absolutely free from micro-organisms.

On the other hand, the great majority of investigators agree that the vaginal secretion frequently contains pathogenic organisms, but a few, as Gönner,[20] Thomen,[50] and Samschin,[44] state that they have been unable to find pus-producing organisms in it. To their statements are opposed the work of Winter,[55] Döderlein,[11] Widal,[53] Steffeck,[48] Witte,[56] and Burguburu,[8] who have found pathogenic organisms in a larger or smaller proportion of the cases examined by them.

Steffeck,[48] who is one of the most pronounced auto-infectionists, examined the vaginal secretions from 29 pregnant women, and found that 41 per cent. of them contained pus-producing organisms, as was proved by inoculation experiments upon animals. From this he concludes that the possibility of auto-infection is clearly demonstrated, and, in consequence, advocates most thorough disinfection of the vagina to guard against its occurrence.

It is thus seen that the results of the various observers stand out in marked contrast to each other; the one side apparently proving that auto-infection is impossible, and the other that it has abundant proof in its favor.

How can these differences in apparently good work be reconciled?—for it is hardly possible that either side is absolutely in the wrong.

The explanation of these apparently contradictory results was furnished in 1892 by Döderlein,[13] in his work on the *Vaginal Secretion*. Basing his work upon the consideration of 195 cases, he was able to show that a marked difference exists in the vaginal secretion in different

cases, and was able to distinguish two varieties of vaginal secretion, namely, normal and pathological.

He states that the normal vaginal secretion is a whitish material of the consistency of clotted milk, and always has a strongly acid reaction. Under the microscope, it contains almost exclusively a long bacillus, a few epithelial cells and occasionally a few yeast cells.

The pathological secretion, on the other hand, generally has a yellowish or yellowish-green color, is of a creamy consistency, and often contains small gas bubbles or masses of tenacious mucus. Its reaction is usually weakly acid, and not infrequently neutral or alkaline. Under the microscope, this pathological secretion is immediately seen to be different from the normal; it contains large quantities of various kinds of micro-organisms, bacilli as well as cocci, and considerable quantities of leucocytes and epithelial cells. Generally a single glance through the microscope is sufficient to distinguish between the two varieties of secretion.

Of his 195 cases, 55.3 per cent. presented normal, and 44.6 per cent. pathological vaginal secretion.

He found that the bacillus of the normal vaginal secretion is a long, slender bacillus, which has peculiar modes of growth and produces an acid allied with lactic acid, to which is due the normal acidity of the vagina. He also found that it was non-pathogenic, and large amounts of it might be injected into animals with impunity. He accordingly concludes that the normal vaginal secretion presents absolutely no possibility for auto-infection; but rather appears to be inimical to the pus-producing organisms; for small quantities of them, when introduced into a vagina with normal secretion, are rapidly killed.

On the other hand, he showed that the pathogenic vaginal secretion did afford an opportunity for auto-infection; for, in 10 per cent. of the pathological cases he found the streptococcus pyogenes, which was demonstrated by inoculation experiments to be pathogenic in more than one-half of the cases.

In the light of Döderlein's[13] work, the divergent results of the various investigators are readily explained by supposing that those who obtained negative results happened to experiment with normal vaginal secretions; while the other observers met with both kinds of secretions.

Through the courtesy of Prof. Michel, who has kindly allowed us to make use of his material at the University of Maryland, we have been able to substantiate to a certain degree the interesting work of Döderlein.[13] So far we have only had opportunity to examine the vaginal secretion from 15 pregnant women who had not been previously examined. Of course, it is impossible to draw numerical conclusions from so small a number of cases, and all we can say is that our work

has clearly demonstrated that Döderlein's distinction between normal and pathological vaginal secretions is certainly justified.

We will now give a very short account of the results of our investigations, reserving the purely technical portions of the work for a later publication, when we hope to be able to report our results based upon a considerable number of cases. We obtained the vaginal secretion from pregnant women, who had not been examined previously, by means of a cylindrical glass speculum, which had been sterilized by steam, and removed portions of secretion from the posterior cul-de-sac of the vagina, with the usual precautions, by means of a platinum loop. The secretion was first tested as to its reaction, then cover-glass preparations were made, and lastly various culture media were inoculated.

In 4 cases we found the secretion to correspond exactly to Döderlein's[13] normal secretion, being intensely acid and containing a pure culture of the vaginal bacillus, occasionally with a few yeast cells.

In 2 cases we found the vaginal bacilli and unidentified cocci.

In 1 case we were unable to obtain any growth upon our media, and in 8 cases we found various organisms which correspond to the usual pus-producing organisms—usually, associated with other organisms. Thus, we found the streptococcus in 2 cases, streptococcus and staphylococcus aureus in 1 case, staphylococcus aureus in 1 case, staphylococcus albus in 3 cases, and staphylococcus epidermidis albus in 1 case.

Thus it is seen that in 8 cases we have found in the vaginæ of non-examined pregnant women organisms which correspond in every particular to the ordinary forms of pus-producing organisms, and among them the streptococcus has occurred three times. In nearly all of the cases the reaction of the secretion was altered, but especially in the three in which streptococci were found. In one of these cases it was neutral, and in the other two very slightly acid.

Inoculation experiments upon rabbits, with pure cultures of the streptococci, gave negative results; but, in spite of that, we believe that we have had to do with pus-producing organisms; for it is well known what very inconstant results follow their inoculation into rabbits.

Our results, combined with the positive results of Burguburu,[8] Döderlein,[13] Steffeck,[48] Winter,[55] and others, make it perfectly clear that pathogenic organisms are frequently found in the genital tract of women who have not been examined, and consequently prove beyond all question that auto-infection is perfectly possible.

Having thus shown that auto-infection is a possibility, it is of the greatest importance to decide how often it occurs, and whether we must reckon with it in our daily obstetrical work.

It is evident that its frequency can only be determined by reliable statistics; for it is readily seen that if pathogenic organisms occur in the vagina in 41 per cent. of all cases, as stated by Steffeck,[48] and their

presence be all that is necessary for the production of auto-infection, the human race should long since have been destroyed. It is evident that other conditions beside the presence of pathogenic organisms within the vagina must be necessary for the production of auto-infection. Just what conditions are necessary we are at present, unfortunately, unable to state.

Ahlfeld,[2] Kaltenbach,[26] and others of the more radical school of auto-infectionists, believe that auto-infection occurs very frequently, and, as we have indicated above, include under that head many cases which are undoubtedly due to external infection. Such being the case, their estimate of its frequency would be misleading. On the other hand, there is a considerable number of obstetricians who hardly believe in its existence. For example, Slavjansky,[46] in preparing his article upon "Obstetrical Antisepsis," for the International Medical Congress, at Berlin, in 1890, wrote to the directors of fifty-two lying-in institutions in Russia, and, among other questions, asked how often auto-infection occurred. All of the answers were in the negative, except one from the University of Dorpat, where one case had been observed. This, no doubt, represents an exaggeration upon the other side of the question, and it appears to us that the question of the frequency of such affections is best answered by the statistics of those who do not employ vaginal douches, and rely upon subjective antisepsis and thorough cleansing of the external genitals, or those who can present a series of cases in which the women were neither douched nor examined internally. Such statistics have been presented lately by Mermann[38] and Leopold,[33] and we will now briefly consider their results.

In March of this year, Mermann[38] reported a series of 900 labors, in which only subjective antisepsis was employed, the vagina not being douched even in operative cases. He has included among his fever cases all rises of temperature above 100° F., even those due to extra-genital causes; and as his experience, and that of his assistants, has increased in subjective antisepsis, his morbidity has gradually fallen from 21 to 6 per cent. His cases are frequently examined, and still his results are excellent. He justly says that the difference between 21 and 6 per cent. is due entirely to increased experience in subjective antisepsis, and that no one should think of attributing any of the 15 per cent. difference between 21 and 6 per cent. to auto-infection. Among the 6 per cent. are included all rises of temperature, even those cases which entered the institution already infected, and those in which the rise of temperature was not due to genital affections. With these results, he asks, is there any room for auto-infection?

During the past five years, Leopold,[33] of Dresden, has devoted a great deal of attention to the subject of fever in the puerperium. Previous to 1889 he employed prophylactic vaginal douches in all cases; since

1889 he has not used them, except in operative cases, and has found that puerperal infections occur only five-ninths as often without their employment as formerly. He accordingly concludes that prophylactic vaginal douches are not only unnecessary, but in many cases are absolutely harmful. During five years, from 1886 to 1890, he has had 919 labors in which the women were not examined at all; 12 of them had mild attacks of puerperal infection; in 10 the infection could be attributed to other causes, and only in 2, or 0.21 per cent., was it possible to attribute the infection to auto-infection.

When we compare the results of Leopold [33] and Mermann [38] with the known fact that bacteriological research shows that pathogenic organisms are frequently present in the genital tract, it becomes evident that auto-infection cannot play so large a part as we would be inclined to admit from a consideration of the bacteriological work alone.

How can this apparent contradiction of clinical and scientific facts be accounted for? In the first place, our every-day experience teaches us that the presence of pathogenic organisms does not necessarily result in the infection of wounds. This has been demonstrated by Bossowski [3] and others, and more recently by Welch and Howard,[52] who introduced considerable quantities of virulent cultures of the staphylococcus aureus into the fresh blood-clots of wounds antiseptically treated, without producing suppuration.

The same has been noticed in the puerperal uterus; for both Czerniewski [10] and Von Franque [19] have in rare instances obtained streptococci in pure culture from the interior of the uterus in apparently perfectly healthy women.

It appears, then, that beside the presence of micro-organisms, certain conditions, of which we are as yet ignorant, are necessary for the production of infection. It is more than probable that certain products of bacterial life must accompany the micro-organisms for them to lead to infection, and it is possible that the organisms which grow in the vagina lack these materials, while those which are introduced directly from without possess them.

It is evident to anyone who considers the matter, that abundant opportunity is afforded, even in the cases which are not examined, for the organisms present in the vagina to gain access to the fresh wounds which result from labor, and this opportunity is greatly increased if an examination be made or an instrument or other foreign body be introduced into the genital tract. Of course, the entire mechanism of labor in normal cases is eminently adapted to prevent organisms which are in the vagina or cervix from gaining access to the body of the uterus. For, in the first place, there is the increased secretion which accompanies labor, then the bag of waters ruptures and more or less completely douches out the lower part of the genital tract. This is soon followed

by the closely fitting head, after which comes another gush of amniotic fluid and blood, and lastly the placenta comes down, drawing all after it, just as a piston in a pump. This is admirably adapted for cleaning out the genital canal, and appears more suitable, as well as more natural, than any sort of douche which we might give.

From a consideration of the clinical and bacteriological facts here adduced, it is evident, theoretically, that auto-infection should frequently occur, but practically it is of comparatively rare occurrence. In the cases in which the vaginal secretion is normal, there is absolutely no possibility for its occurrence; and in the cases in which the vaginal secretion is pathological, it does not occur nearly so often as one would expect, although conditions which are apparently favorable for its occurrence are frequently present.

Such being the case, we believe that the general practitioner will do best for himself and his patient if he acts as if there were no such thing as auto-infection, and does not attempt to deal with any organisms which may exist within the vagina, and contents himself with the most scrupulous cleanliness on his part and careful disinfection of the external genitals of his patient. As soon as the practitioner admits that auto-infection occurs, his only rational procedure is a prophylactic disinfection of the vagina, with all its disadvantages. And who does not believe that he will do far more harm than good with the douche, and introduce with it far more organisms than he kills or washes away? We can only agree with Mermann,[36 37] who states that it is impossible to disinfect the vagina thoroughly with the means ordinarily at the command of the practising physician, and with the patient in her bed.

This does not apply at all to well-regulated hospital practice, for there the douche may be given with greater antiseptic precautions. But to us it appears that routine vaginal douching, even in hospital work, is capable of doing more harm than good. The question of prophylactic vaginal douching is, however, still *sub judice*, and at present it would appear ill-advised for us to condemn it unreservedly.

We believe that the best results will be obtained when, in addition to the most rigid subjective antisepsis, we consider each case separately, and make a preliminary microscopic examination of the vaginal secretion. If the secretion be normal there can be no possible justification for the use of the douche, but if it be pathological there may be.

Döderlein[13] states that vaginal injections of 1 per cent. lactic acid will frequently convert pathological into normal secretions within a few days. We have not tested this ourselves, but feel that it should be tried if possible. When there is not sufficient time for the lactic acid injections, or if they fail to accomplish the desired end, we should resort to the prophylactic sublimate douche. This applies to hospital practice but we repeat once more that the conception of auto-infection is danger-

ous for private practice, and will lead either to neglect of subjective antisepsis or to the prophylactic douche and all the consequences of meddlesome midwifery.

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