

Department of Reviews and Abstracts

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Collective Review

The Prophylaxis and Treatment of Puerperal Infections

(A Critical Review of Recent Literature)*

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The importance of the problem of puerperal sepsis is succinctly stated by Krusen¹: While in the opinion of the medical profession and of the laity the number of deaths from puerperal septicemia is fast decreasing, many eminent obstetricians have shown that outside of well-managed hospitals there actually has been no great reduction in totals or in the rate of deaths. It is high time that obstetricians teach, by precept and example, the gospel of puerperal complications. DeLee, never tiring in his efforts to bring the profession to a proper realization of the seriousness of the situation, says in a discussion of everyday obstetric problems: "Taking everything into consideration I feel sure that the statement cannot be contested that 8000 women die annually in this country from puerperal infections." The same discouraging situation apparently also exists in Europe. Quoting an English writer, Brock²: "If results are properly gauged by accurate figures, as those offered in the British health statistics, then it must be admitted that the mortality rate from puerperal sepsis shows only a small reduction. A study of these returns for the past seventy years reveals a death rate for some of the earlier years almost identical with that of some recent years." Grace L. Meigs³ made for the Children's Bureau of the U. S. Department of Labor a thorough study of maternal mortality from all conditions connected with childbirth in the United States and certain other countries. In the summary we find among others the following statements: "In 1913 in this country at least 15,000 women died from conditions caused by childbirth; about 7000 of these died from childbed fever, a disease proved to be almost preventable, and the remaining 8000 from diseases now known to be to a great extent preventable or curable. Physicians and statisticians agree that these figures are a great underestimate. In 1913 childbirth caused more deaths among women fifteen to forty-four years old than any disease except tuberculosis."

"Only two of a group of fifteen important foreign countries show higher rates from this cause than the rate in the registration area of the United States. The rates of three countries, Sweden, Norway, and Italy, which are notably low, prove that low rates for these diseases are attainable. The death rates from childbirth and from childbed fever in this country apparently are not falling to any great extent. Indeed, during the thirteen years from 1900 to 1913 they have shown no demonstrable decrease."

"These facts point to the need of higher standards of care for women at the time of childbirth. Improvement will come about only through a general realization of the necessity for better care at childbirth. If women will demand better care, physicians will provide it, medical colleges will provide better

*Elaborated from a paper read at the Meeting of the American Gynecologic Society, Chicago, May 24-26, 1920.

training in obstetrics, and communities will realize the vital importance of community measures to insure good care for all classes of women."

Reading these lines one cannot suppress a feeling of wonder why the women of this country, who must be credited with most of the notable achievements in child welfare, have not yet awakened to the import of this serious problem of their own welfare. It does not seem fair that the medical profession, by assiduous and effective propaganda, has familiarized them with the perils of cancer, but at the same time has concealed from them the greater risks of childbirth. It is a disingenuous procedure to extol the attainments of modern surgery and to hide the lamentable deficiencies, not of the science, but of the everyday practice of obstetrics.

PROPHYLAXIS

Is puerperal sepsis an entirely preventable disease? Probably not. Zange-meister and Kirstein⁵ a few years ago advanced proof that the vagina contains saprophytes which occasionally ascend into the uterus. Thus nobody directly connected with the delivery may be actually responsible for the infection. Loeser⁶ more recently investigated most thoroughly the problem of the latent infection of the birth canal. Much work has been done in the past to study the invasive faculties of all vaginal bacteria, including the anaerobes, always with particular consideration of the streptococci. The results of these various investigations, in general, concur in the fact, that but few of the bacteria of the vaginal flora are true saprophytes, that the majority of them, under favorable conditions, might exhibit pathogenic characteristics. Loeser assumes that in the genital tract of women during the reproductive age conditions change so often and so greatly, that conditions favorable for the development of pathogenic characteristics by some of the vaginal microorganisms are likely to prevail at some time or another. Therefore, it is justifiable, and possibly preferable, to admit the existence during pregnancy of a state of latent infection. This assumption obviously does not exclude the possibility of an added exogenous infection as the result of careless manipulations, etc. The traumatism of labor, open wounds, presence of blood, etc., represent circumstances, most propitious for bacterial growth. If in the vagina, where, as a rule, innumerable varieties of bacteria live as saprophytes in harmonious symbiosis, one particular bacterium is found in pure culture, the deduction seems justifiable, that conditions prevail which facilitate the development of this one form at the expense of all others. Loeser feels that the assumption is warranted, that these also might be the conditions under which this particularly favored bacterium also develops virulency, or an increased virulency. In this manner it might be explained that latent microbes, and not by any means only streptococci, will suddenly assume the characteristics of aggressiveness. In regard to streptococci in particular, it seems probable that the change of the chemic reaction of the vaginal discharge from the normally acid to alkaline after labor, enables them to manifest their innate quality of invasibility which is inhibited, as well known, by growth in acid media. Only bacteria which are pathogenic or become so under certain conditions are capable of provoking the production of defensive antibodies in the invaded human organism. Therefore, the presence of agglutinating substances proves the pathogenic character of the bacterium, or indicates a state of latent virulency if the characteristic clinical symptoms of an infective process are absent.

Another type of puerperal infection, not entirely preventable, but fortunately rare, is that due to the tetanus bacillus. Spiegel,⁷ from an analysis of 66 authentic cases of puerperal tetanus, recorded in literature, concludes that the tetanus bacilli enter the circulation either from the endometrium or from perineal wounds. The prognosis of this disease is entirely dependent upon

its early recognition. Immediate institution of the serum treatment yields most satisfactory results, especially in the more chronic cases in which the symptoms develop gradually until about the fourth day the first typical severe convulsion occurs.

In the light of recent advance of our knowledge concerning focal infections their possible relation to puerperal fever is worthy of careful study. This problem is discussed by Talbot.⁸ Although he argues only theoretically on the problem, without advancing a single convincing proof, one must agree with his general conclusion, that from a prophylactic point of view it is incumbent upon the obstetrician to examine every pregnant woman to ascertain whether such a focus exists, and to have it removed before it possibly could do harm. In a similar manner, Davis⁹ refers to the intestinal tract as a potential source or seat of an infectious process that might complicate pregnancy or the puerperal state.

Contradictory views will be found in literature (and textbooks) concerning the importance of the duration of labor after rupture of the membranes in the etiology of endogenous puerperal infections. This problem is the subject of a very comprehensive paper contributed by Rohde.¹⁰ He concludes that both in women who have, and those who have not, streptococci in the vagina, the duration of labor after the escape of the amniotic fluid does not play a rôle worthy of consideration in the causation of fever, during and after labor, and in puerperal mortality. Rohde presents so many carefully arranged tables covering several thousands of cases, on which he bases his conclusions, that it seems fair to assume that he has definitely settled this question.

Another most noteworthy fact is recorded in a paper by Slemmons.¹¹ Extensive statistics indicate that in from 2 to 3 per cent of cases a rise of temperature above 101° F. can be noticed during labor. In severer cases, after delivery the fever continues. There has never been any doubt that in this group the intrapartum complication is dependent upon a bacterial infection.

In the other group of milder types, probably in the majority of cases, the rise of temperature passes unnoticed. As a rule, the fever is ascribed to the effect of prolonged and violent uterine contractions. Warnekros (in 1913) established the fact that also in these cases the rise of temperature is of bacterial origin. Out of a total of 25 febrile women in labor he obtained positive blood cultures in eighteen.

Slemmons extended the search for the source of this infection to the placenta which he studied in stained sections. Most conclusive evidence was thus obtained for two facts: First, that intrapartum fever, unless attributable to some accidental cause such as tuberculosis, is due to a placental bacteriemia, secondly, that this infection does not proceed from the maternal circulation into the villi, but vice versa. The bacteria evidently enter the placenta by way of the amniotic membrane and the amniotic fluid. Generally the latter becomes infected, because the membranes had ruptured prematurely (which is not in accord with the findings of Rohde quoted previously), labor prolonged, and repeated vaginal examinations had been made. Since in these cases the placental infection usually is limited to the amniotic surface of the organ, the complication is likely to prove more serious to the fetus than the mother. It probably often is responsible for the fetal death.

Hematogenous contamination of the amniotic fluid may occur in any case of maternal septicemia, as has been emphasized by DeLee and also Curtis, but more common is the ascending type of infection.

In regard to their prognostic value, Slemmons expresses the opinion that positive cultures, obtained during labor, are of no value, while in the puerperal state negative cultures signify a more favorable prognosis than positive ones.

Brock,³ already quoted, like Slemmons emphasizes the great advantage of

avoiding frequent internal examinations. Careful prenatal study of the patient makes this possible. It might be mentioned in this connection that the German literature of the war years contains many articles praising the superiority of external abdominal, and rectal over vaginal examinations during labor. The absolute lack of rubber gloves forced German and Austrian physicians to find a substitute for vaginal explorations.

Other necessary changes in the customary obstetric technic in the interest of a better puerperal prophylaxis are advocated by Berry Hart.¹² Much more care should be taken in preventing perineal lacerations. Crede's method of expression of the placenta, in his belief, is a very serious error in the management of labor. It tends to leave pieces of tissue attached to the uterine wall, because the placenta is forcibly removed before it had become completely separated.

The very satisfactory results of prophylactic, active immunization with specific sera and vaccines in many of the acute infectious diseases prove the feasibility of similar efforts to obtain effective immunization against streptococic puerperal sepsis. Joetten¹³ discusses the literature on this subject, and acknowledges the final failures of all previous attempts. He prepared a vaccine from six different strains of streptococci cultured from septic puerperæ. Experimenting with a gradually increasing dose of from 25, 50, 100, 250 up to 500 millions of bacteria to one c.c., he observed a gradual and proportionate decrease in puerperal febrility. In 819 cases, injected prophylactically only with 25 to 50 millions of bacteria, the percentage of febrility was 16 per cent in the last series of 126, with a dose of 500 millions of bacteria, it had been reduced to 7.1 per cent. Also the cases of streptococic death seemed to decline in a similar ratio. Of the 819 cases of the first group four died, of all the remaining cases, treated with a dose above 50 millions of bacteria, only one died of a streptococcus sepsis. Joetten does not wish to exaggerate the meaning of these observations, but feels that they at least leave hope that successful protection against streptococcal puerperal sepsis might be obtained by an improved method. Garcia¹⁴ claims good results from a routine injection of 20 to 40 c.c. of antistreptococcus serum in every woman entering the maternity in labor.

THERAPY

The question of the value of such surgical procedures as hysterectomy, ligation or resection of veins, etc., is still under discussion, but a marked trend toward conservatism can easily be noticed.

From countries far apart, from France, Australia and South America, come expressions of more or less enthusiastic approval of operative interference. Cadenat¹⁵ feels sure that many more women, suffering from puerperal sepsis, could be saved by a vaginal hysterectomy, newly devised by him. It can be performed in from three to fifteen minutes, avoids contamination of the peritoneum and insures a wide channel for drainage. He considers this operation indicated in every case, in which no appreciable improvement within 24 hours is seen after thorough curettage of the uterus—and it may be emphasized here, that this is the only paper, which the reviewer has seen in recent literature, in which a writer mentions the curette without condemning its use in the puerperal septic uterus. An article of Nyulasy¹⁶ does not specifically mention the extent of the author's personal experience with excision or ligation of the infected pelvic veins, but he is convinced that early operation may save many cases which are lost when treated on the lines hitherto followed. "Early operation to me has become a supreme duty." Turenne¹⁷ thinks that, contrary to generally expressed opinion, puerperal, septic, utero-pelvic thrombophlebitis has signs, symptoms, and a clinical evolution which permits a diagnosis in the majority of cases. Although in more than half of these cases there

is a tendency toward subsidence and recovery, the high mortality of the remaining justifies modern operative methods of treatment. Surgical intervention, especially ligation of the thrombosed veins, is rational. Ligation of all the efferent venous trunks of the genital zone is desirable. Operations on veins are contraindicated by a permanent bacteremia, accessible thrombosis and in cases of visceral pyemic localization.

It proves much easier to quote papers, based on thorough anatomic investigations or on careful analysis of a very large clinical material, which discourage surgical treatment in general or condemn certain operations.

Sampson¹⁸ shows by x-ray studies, that foreign material can be easily forced from the uterine cavity into the uterine veins, if the endometrium is injured or has been removed by curettage. He draws the most plausible conclusion that uterine contractions following relaxation when the cervical canal is obstructed, and intrauterine douches supply sufficient pressure to effect this escape of material from the interior of the uterus into its veins. This surely explains one way by which a general puerperal infection may result from intrauterine manipulations. Halban and Koehler,¹⁹ in a comprehensive monograph published in book form, consider a very extensive material studied at autopsies. Analyzing the anatomic findings from the viewpoint of excision or ligation of pelvic veins, the surgical treatment of peritonitis, and hysterectomy, they feel that these findings clearly speak against the possible usefulness of all such procedures. Therefore, it cannot be surprising that surgical therapy of puerperal sepsis has rather generally proved a failure in practice. They are inclined to believe that in some of the operated cases seen on the postmortem table the operation possibly had removed the chances of spontaneous recovery. Conditions seem slightly more favorable for surgical intervention in peritonitis. Halban and Koehler thus arrive at the final conclusion that hope for better results does not lie in surgery but in an improved specific antibacterial treatment, or possibly in the discovery of a specific chemie bactericide of the type developed by Ehrlich.

A critical survey of the various methods of treating pelvic infections by Polak²⁰ begins with the statement that puerperal infections are directly proportionate to the number of vaginal examinations, therefore, abdominal and rectal examinations are preferable. Curative treatment is based on the proper recognition of the natural pathology. Realizing that the interior of the uterus is the principal portal of entry for bacterial infections, the fruitlessness and fallacy of all intrauterine manipulations, of curettage or irrigation, must be obvious. Drainage is more effectively obtained in the Fowler position, supplemented by having the patient lie on her abdomen. Ergot, pituitrin and ice-bag stimulate contraction and retraction of the uterus. After bacteria once have begun to pass from the uterus into the myometrium, or into lymph and blood-vessels, intrauterine manipulations can do only harm. In parametrial infections he considers absolute conservatism the best treatment. In beginning peritoneal invasion he follows an expectant therapy. Only if there is evidence of extension, the posterior culdesac may be opened. General hygienic and dietetic measures will help the patient in the fight against the bacteremia. Vaccines and sera have not proved of advantage. In cases of general peritonitis, incision, drainage, etc., have given no better results than the expectant plan.

The entire therapy of puerperal fever is still more exhaustively discussed by Schaefer.²¹ Every form of local treatment, either for puerperal ulcer or septic endometritis has been definitely discarded. They never do any good, but are likely to do harm. The antiseptic vaginal douche is useless, but at least less dangerous than the intrauterine douche which may be directly responsible for an acute pyosalpinx or a general peritonitis. Any attempt to remove the septic endometrium with curette or spoon is extremely objectionable. There

are at present only two indications for local treatment left: (1) In cases of obvious retention of lochial secretions, in which the rise of temperature coincides with the sudden stoppage of all lochial flow, a glass tube may be carefully introduced into the uterus; (2) larger pieces of necrotic placenta may be removed, but only with the finger, smaller fragments are better let alone.

Extirpation of the infected uterus, as a rule, proves futile, with the sole exception of a postpartum necrosis of a fibroid. Surgical interference in cases of puerperal infection in the Berlin Frauenklinik at present is limited to: (A) Opening of pelvic cellular abscesses. If the tube contains pus, conservatism, rest and opium are preferable for immediate treatment. (B) In cases of peritonitis two flank incisions, without subsequent lavage, are made, preferably under local anesthesia, as soon as the diagnosis is positively established by the aspiration of pus through a hypodermic needle. (C) In cases of thrombophlebitis, ligation gives satisfactory results only in chronic cases, in which the process has persisted for several weeks, has remained limited to the veins, and has not caused phlegmonous processes in the uterus or surrounding tissues. In all acute cases the thrombosis is very likely to progress beyond the ligation, and the operation then may become responsible for a parametrial abscess, if not a peritonitis.

But most important, continues Schaefer after having finished the consideration of surgical therapy, is the general treatment which should be instituted promptly in every febrile case, in an endeavor to localize the process and to help the organism to develop protective powers against the bacterial invasions. For the purpose of obtaining early localization the use of heat at present has completely replaced the ice-bag formerly employed. For the purpose of general protection it is important to rid the circulating blood, as promptly as possible, of the germs already entered, and to prevent further entrance. A clear picture of the situation can be obtained only by careful study of the blood, repeated at least every other day, always including a blood culture. Antistreptococcus serum has failed with few exceptions, also the various colloidal silver preparations. Trials with the administration of methylene blue by mouth proved futile. Then Bumm suggested the combined use of antistreptococcus serum and methylene blue. This new treatment has yielded satisfactory results when applied in the following manner: 50 to 60 c.c. of antistreptococcus serum are injected subcutaneously into the thigh, followed in one or two hours by the subcutaneous injection of 0.05 grams of methylene blue in 20 c.c. of physiologic salt solution. Under steady control of the blood these injections are repeated daily for several days. Experience gained in the past two and a half years, in the opinion of the writer, encourages a continuation of this medication.

Reference has been made to the hope expressed by Halban, that a useful general chemie bactericide for puerperal sepsis might be developed. With this problem deals a paper of Miller and Chalfont.²² Many different solutions have been used intravenously in the treatment of puerperal bacteremia. But, as the writers find from a study of the literature, apparently not one has stood the test and none has been adopted for general use. Bleyne tried salvarsan, and suggested 30 centigrams as a safe dose, but Hussy warned against its employment on account of its toxicity. Miller and Chalfont recommend arsenobenzol in a dose of 6 milligrams given immediately without the delay of a blood culture when the case offers the clinical symptoms of a blood stream infection. A decided drop in the leucocytes without a corresponding drop in temperature and pulse rate within the next twenty-four hours was considered an indication for repeating the injection. Eleven patients in all so far have been treated in this manner. Five received only one injection, three had two, one had three, and the two remaining, four injections. In every case they succeeded in ridding the blood stream of the invading germs.

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Selected Abstracts

The Bacteriology and Chemistry of the Vagina

DeLee: Trichomonas Vaginalis Vaginitis. Illinois Medical Journal, 1920, xxxvii, 186.

DeLee calls attention to this type of obstinate vaginitis, which is not rare. It usually proves most refractory to the customary types of treatment, because it is not properly diagnosed. Its clinical symptoms are persistent, and the profuse vaginal discharge, causing much annoyance to the patients on account of burning and pruritus, by way of sleeplessness leads to a neurasthenic "run down" feeling. The discharge is acrid, of a disagreeable odor, very irritating, and often causes the formation of pointed condylomata. The peculiar, granular appearance of the vaginal mucosa, "rough like a nutmeg grater," usually with small hemorrhagic points, almost enables one to make the diagnosis, which, however, must be confirmed by a microscopic examination of fresh vaginal discharge for the characteristic *Trichomonas vaginalis*. The writer found the following treatment most effective: On the first day, vagina and vulva are most carefully scrubbed, vigorously, with tincture of green soap and water by means of a rough cloth. The soap is rinsed out with distilled water. The process is repeated three times, followed by a 1:1500 mercuric chlorid douche and finished with another douche of distilled water. The patient is kept in bed. Next morning, the vagina is again scrubbed with green soap and sterile water, and then packed with cotton soaked in glycerin (4 ounces) and sodium bicarbonate (1 ounce). The next morning, cotton is removed and sterile water douche is given. As a rule, on the next following day the microscope will prove the disappearance of the trichomonas.

Schroeder and Loeser: Trichomonas Colpitis. Monatsschrift für Geburtshilfe und Gynaekologie, 1919, xlix, 23.

Hoehne (in 1916), as the first, emphasized that *Trichomonas vaginalis*, generally considered a harmless parasite, is found in strikingly large numbers practically in all the severer and more obstinate types of vaginitis. He concluded that there might exist an etiologic relation. Later Kuestner, Traugott, and Wille confirmed Hoehne's observations, and also accepted his explanation. Wille stated that trichomonas can be detected in about 40 per cent of all free vaginal discharges. In a total of 2183 cases examined, Schroeder and Loeser, however, found only in 120 instances trichomonas. Investigating thoroughly the entire bacterial flora in these cases, and comparing their results with those of many previous investigators, they can only confirm the common assumption that most of the bacteria vegetating in the normal vagina originate