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Boardmann (W. E.)

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OF BOSTON.

Read at the Annual Meeting of the Massachusetts Medical Society,
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WITH reference to many, notably the acute diseases, we recognize to-day consecutive clinical and pathological phenomena which enable us to establish what is called their "natural history," a generally accepted term which may possibly admit of a thoroughly materialistic interpretation, but which furnishes to most minds an argument in favor of the doctrine that "Disease is a part of the plan of creation,—one of the myriad expressions of divine thought."

Modern researches, which have developed this knowledge of diseases, have naturally stimulated renewed investigations regarding their origin as part of this "plan," and to-day we are in possession of etiological facts which were not before possible, though vaguely suggested ages ago and repeated in succeeding epochs, these results having been obtained through modern means of scientific study and research. Particularly is this true of the so-called zymotic diseases, with regard to which the evolution of the prevailing ideas as to their origin and immediate cause forms a most attractive study.

The history of former periods, even the most remote, records the occurrence of epidemics, of various kinds, which have devastated entire regions and have inspired contemporaneous medical thought with the endeavor to assign causes for their origin and spreading. Hence there have been transmitted to us various hypotheses, most of which have been devised to include a corruption of the atmosphere as the necessary element in the production of the diseased conditions. And it is interesting to learn that some of the writers even of

antiquity assumed to explain the origin of the pestilences by the entrance into the human system of living animals or low organisms, beings which floated unseen in the atmosphere. The improvement in the microscope and its more extended use led to a more definite advance towards the appreciation and acceptance of the theory of a *contagium vivum*, from the discovery of the existence of spermatozoa within the body, which was considered to establish the fact that animals may and do live within the human system, and then the recognition of infusoria in the atmosphere easily led to the theory that certain diseases were caused by the entrance of these into, and their multiplication within, the body. But the means and methods of investigation were too imperfect to admit of an accurate demonstration of this relation of cause and effect, and it has remained for the scientists of our day to prove the exact relation by the only proper scientific method; that is, investigators first recognized and demonstrated the constant association of certain elements with special diseases, and finally the chain has been made complete, at least in the case of some affections, by properly conducted experiments which have shown indisputably that these associated elements or germs are efficient to originate the specific diseases. In other words, the gradual progress of scientific thought and study and the continued improvement in the methods and appliances for physiological and pathological investigations have enabled the master minds of successive generations to furnish additional facts and information which, slowly but surely, have led up to a final demonstration of the actual relation of cause and effect, which is exhibited by some of the infectious diseases; and the promise is good that in time, possibly in the near future, our knowledge with regard to other diseases will be increased in a similar direction.

The affection which is now generally regarded and described as puerperal septicæmia and which has always

prevailed in varying degrees of intensity, but under different names, and been interpreted in various ways, according to the doctrines of etiology and pathology which have been advanced from time to time, is an apt illustration of the line of thought which is suggested by these brief preliminary observations which I have made. From the time of the earliest records which have been preserved, to the period of the "dark ages," it was the general belief that puerperal fever was the result of a poisonous condition of the blood. It was imagined that from various accidents, chiefly from the suppression of the lochial discharge, "the blood and humors, accumulated during pregnancy, returned into the general venous system, there became corrupted and were capable of directing themselves towards an organ in which they determined inflammation; at other times they remained in the uterine veins, there putrefying and generating fever." The doctrine of humoralism, which prevailed for so many centuries, founded chiefly upon mere hypotheses which had their origin in superstition or the fanciful interpretation of observations, admitted of no other plausible explanation of the phenomena which were observed in this disease. In later times, when autopsies became more frequent and the knowledge of post-mortem appearances was more exact, solidism came into vogue, and for a time the humoral pathology was in abeyance, until about two centuries ago a reaction again ensued and, in the succeeding century, this doctrine was elaborated so as to include the idea of a fermentation within the human system, which could be induced by the action of elements introduced from the outside. At first the decomposing lochial discharge was regarded as the immediate and only efficient agent of the kind. Later the ancient idea of a nosocomial atmospheric influence was revived, but in a more definite form, as applied to the contamination of the air by emanations from diseased bodies; still later, by foulness occasioned by

inadequate ventilation and faulty sanitary conditions of hospitals and dwellings; and, later yet, the idea of direct inoculation by contagious matter, carried from decomposing wounds or cadavera, was quite generally accepted. Meanwhile, the true theory of the zymotic nature of the disease, as due to miasmata, was suggested, and during nearly two centuries this has gradually been elaborated. Originally, the theory with regard to the agency of the miasmata had no scientific basis to substantiate it, and the hypotheses have always required, as a necessary element of their acceptance, the *divinum quid* of Hippocrates,—the something which is beyond our comprehension, until the microscope enabled investigators to formulate the microbial theory of zymotic diseases and to recognize the occurrence of specific bacteria in connection with puerperal disease, and the pathologists have succeeded in tracing the intimate relation of these organisms with the various morbid processes of this affection. As the latest theory with regard to the rôle which these microbes play in connection with the disease under consideration, as well as with infectious diseases in general, we have recently had presented the results of investigations and experiments which are said to demonstrate that the element, which is directly concerned in inducing the diseased phenomena, is a chemical one, an alkaloid which is generated by the microbes, in other words that the bacteria merely serve as vehicles for the generation and transportation of the poisonous virus. Accepting this latest contribution to our knowledge of the origin of the septic processes, we still are compelled to rely clinically upon the practical deductions derived from the more prevalent microbial theory of disease, the value of which in surgery and obstetrics, during the last two decades, is attested by the universal experience both in hospital and private practice.

It will be unnecessary for me to go into minute details in order to explain this theory, for, without doubt, all of

you are quite familiar with it. I will merely mention, perhaps as a proper preliminary to what I shall have to say later, that what we have lately regarded as puerperal septicæmia requires the presence of pathogenic germs, or bacteria, within the utero-vaginal canal; a solution of continuity therein and an adequate susceptibility of the individual. In regard to the exact nature of this so-called susceptibility, we have no precise knowledge, any more than we know why, sometimes, one of two children, in the same household and under similar exposure, will take the scarlet fever and the other will escape. In a general way, it has always been observed that an individual who is in a debilitated state, mentally or physically, is more prone to exhibit unfavorable symptoms after wounds and injuries of any kind, and the general condition of women after confinement is notably such as to invite the occurrence of a wound disease, while the parturient canal, after labor, presents an extensive wounded surface which offers a fertile field for the sustenance and multiplication of bacteria, which may be brought into contact with it by the atmosphere or by other means, and numerous openings through which they may effect an entrance into the system. The bacteriologists claim the necessary agency of specific, pathogenic bacteria, and this idea of specificity carries with it that of meeting with suitable media, such as are found in luxuriance within the genital tract during the puerperal period. The new chemical theory does not invalidate, indeed rather tends to confirm this claim of the vitalists, as well as to give additional force to their assumption, as a future and near possibility, of a more distinct and numerous classification which will explain the occurrence of the definite phenomena presented by puerperal septicæmia.

The argument is always made that, if these favorable maternal conditions are commonly present during and after childbirth, and the bacteria are universally at hand, ready to

work their mischief, how does it happen that most women exhibit no symptoms of a septic process? We must admit, in reply to this, that they are protected by the conservative laws of nature under which, in these instances, there are wanting, in the patients or their surroundings, certain factors which are necessary for the development of the septic phenomena, just as many individuals, after obvious adequate exposures, are not affected with various acute diseases.

But is it the fact that puerperal septic disease is so rare as it is commonly asserted to be by physicians generally, and even by writers of authority? Physicians frequently refer to a large personal obstetric experience, where no antiseptic precautions have been taken, and yet they report a very small mortality and a trifling percentage of, or no, septicæmic cases, even when, as a rule even, the surroundings of their patients would seem to have been such as to favor the occurrence of the affection. In this connection we must bear in mind that evidence, derived from such general statements, is encumbered with a large element of doubt as to its value; that the experience of many, indeed of most of these individuals, extends back into years when the nature of septicaemia was imperfectly understood, and, further, a general statement of experience, covering many years and not confirmed by a definite reference to recorded details, is always open to question as to its accuracy.

Nor is it possible to obtain a reliable estimate of the mortality from septic disease among lying-in women, even from the published registration reports, the deductions which may be made from the mortality statistics furnishing a very inadequate idea of the amount of septic disease which prevails everywhere. Still a brief analysis of these will be sufficient to show that there is a quite constant element of this disease in our State. For this purpose we are necessarily restricted to the classification which enumerates these cases under the title, metria or puerperal fever, while it is

obvious that many of the deaths, returned as from septicaemia, peritonitis, childbirth and some other causes, strictly belong to the category which concerns our present subject. But, even from this restricted source of information, it appears that, in the period of five years, 1878 to 1882 inclusive, there occurred 86,694 deaths of females, *of all ages*, of which number 498, or 1 in 174, were classed as due to metria, and, in the succeeding quinquennial period, 497 deaths occurred from this cause in a total of 95,769 deaths of females, or 1 in 192. In the latest published report of this State, for 1887, only 69 deaths from metria are recorded, a less number than for many years. In the same year there were 4,361 deaths of females between the ages 15 to 40, which period may be fairly taken as covering the childbearing age. Hence of this class one death in every 62 was due to metria. If it were possible to correct this proportion by the addition of those cases which were classified under septicaemia, childbirth, etc., but properly should be classed as metria cases, the evidence of the mortality from puerperal septic disease in our State would, I think, astonish most of us, and especially deserve serious attention when we consider that this mortality affects women in the prime of life, whose loss to families and communities is incalculable.

While we learn from the statistics of mortality that the deaths from metria form quite a noticeable feature, the same cause is assigned for death in one of every 507 confinements during the years 1883-1887, inclusive, which does not present such a sombre picture, it is true, but there is a point of great importance in this connection to which allusion is seldom made, namely, that we have no means of ascertaining the number of cases of puerperal fever which survive, with more or less protracted ailments and local affections, which have their origin in the various septic processes and entail prolonged suffering and disability, and, not infrequent-

ly, an ultimate fatal issue. I venture to state that the experience of most, if not of all, of you, will furnish records of a large number of such chronic invalids who have become serious burdens to themselves, their families and the communities in which they reside.

With our present knowledge, it is impossible to demonstrate the fact, but the weight of scientific evidence tends to show that, while there are some local affections, incident to the puerperal period, which may be regarded as aseptic, most of them clearly have a bacterial origin, and it is an accepted fact that a very large proportion of the pelvic affections, of women who have borne children, which gynecologists are called upon to treat, have their origin in these localized diseases of bacterial origin.

It is asserted commonly that prophylaxis of puerperal septicæmia is a subject which concerns lying-in hospitals chiefly, if not solely. It cannot be denied that the disease formerly was the bane of these institutions, but the gradual increase in knowledge with regard to its origin has been attended by a continued improvement in their mortality and clinical records, so that to-day it may safely be stated that, in maternities throughout the civilized world where aseptic midwifery is in vogue, septic disease has become a rarity. The experience in the Boston Lying-in Hospital, with which I have the honor to be connected, furnishes a very striking illustration of the truth of this statement, as has been conclusively shown in the paper, presented to the Obstetrical Society of Boston and published in the Boston Medical and Surgical Journal for January, 1887, by my colleague, Dr. Richardson. In this paper is given a resumé of the mortality from septicæmia in the hospital, from the time of its opening in 1873, and instructive charts are exhibited which indicate the gradual disappearance of septicæmia and of "febrile temperatures" (and to this latter point I would direct your attention as being one of the utmost significance)

in quite direct conjunction with the approach to our present practice of avoiding the occurrence of the disease by the most strict adherence to rigid rules which are regarded as efficient in preventing the entrance of active bacteria into the parturient canal, and in sterilizing those which may unavoidably gain access to these cavities. And it should be added, that these results have been obtained without any material change in the buildings or their surroundings, or in the class of patients, while these have increased in number from year to year.

The registration reports, too, disclose the fact that the deaths from metria occur mostly outside of Boston, and, therefore, contradict the assertion that septicæmia is an affection peculiar to hospitals. General medical experience in gynæcology, also, which, as I have already stated, is largely connected with affections of bacterial origin, serves to give a very practical value to the consideration of aseptic obstetrics as applied to private practice.

To recapitulate, I have endeavored to show that puerperal septic disease is scientifically demonstrated to have a bacterial origin, and it is immaterial, for our present purpose, whether we accept the chemical or the vital theory of their action; that it is probable that most of the local affections incident to the puerperium belong to the same septic class of diseases; that these occur throughout the State, in both rural and urban districts, more commonly than physicians have been willing to admit, and, this being true, it may readily be understood that deaths from this cause, and the much more numerous cases which survive, to become more or less chronic invalids, entail a serious burden upon the welfare and prosperity of families and the State; finally that the experience in hospitals exhibits the adequacy of due prophylaxis to prevent septic disease.

Our duty, therefore, as obstetricians, ought to be obvious. We are under obligation to add our contribution to the con-

stantly widening province of preventive medicine, by applying to the lying-in period the lessons derived from the bacteriologists.

It does not come within the scope of this paper to discuss the treatment of puerperal septicæmia, but I have merely to present the theory of its origin and the means and methods of preventing its occurrence.

The paper by Dr. Richardson, to which I have alluded, concludes with what may be regarded as an axiom. He says "the experience of those who have investigated this subject and practically tested the method of treatment has demonstrated that *absolute asepsis means absolute freedom from puerperal septicæmia, and that the occurrence of puerperal septicæmia means the absence of absolute asepsis.*" Subscribing fully to this statement, it remains for me to present for your consideration some general plan for accomplishing an adequate asepsis of the lying-in woman, premising that, while we must regard puerperal septicæmia as a preventable disease, as a general statement, our present knowledge and usual means of information are insufficient to warrant the assertion that it can, as yet, be eradicated altogether, for we may well understand, and experience in hospitals teaches, that cases will occur, in spite of the exercise of every known precaution, from sources which it is impossible to detect and against which consequently we are unable to provide.

Prophylaxis, to some extent, against this disease has been employed for a long time, more particularly since Peu, in the middle of the 17th century, made known the fact that its prevalence in hospitals was occasioned by the foulness of the atmosphere in the wards. Shortly after this, Thomas Welles elaborated the idea of fermentation, as applicable to zymotic diseases in general, and formulated rules for the protection of individuals, but attention of this nature was directed to hospitals largely, and, from that time till a very

recent period, little has been advised for patients confined outside of hospitals, except the simple, routine rules which apply to labor in general. But from the ideas as to the origin of the disease, which prevailed so many years ago, has developed the true principle of antisepsis, which, however, was applied, with a mere approach to perfection, to the disease after it had invaded the system, yet, at the same time, there were established, out of this principle, rules of prophylaxis which, if carried into private practice, would have accomplished a great deal in the way of prevention of puerperal disease. But the error prevailed then, as ever since, that the necessity for such procedures is furnished only in hospitals, notwithstanding the fact that isolated cases, and, indeed, epidemics have always occurred and been commented upon.

In those remote days, the endeavor was made to provide for adequate ventilation, to furnish, as far as possible for the time, an adequate and suitable temperature; to insure cleanliness of the patient and her surroundings; to avoid unnecessary vaginal examinations and interference with the normal process of labor. Vaginal and even intra-uterine injections of water, soothing liquids and disinfecting solutions, were employed, in appropriate cases, to promote the escape of decomposing blood clots and remains of the placenta and membranes.

While, however, the rules which were adopted were correct in principle, they were necessarily defective in their application, owing to the lack of knowledge as to the precise details required to ward off the disease and to their comparatively restricted resources.

A great advance was made, under the guidance of the ideas of Semmelweis, towards a more thorough asepsis of the patient, but it was not until very recent years that the true doctrine of absolute asepsis was established upon the basis of the germ theory, and, whether we accept the chemical or the vital interpretation of the phenomena,

whether we subscribe to the belief in the autogenetic or in the heterogenetic forms of the disease, the central idea prevails that specific germs are the efficient agents, and that these are to be kept out of the utero-vaginal canal, so far as this is possible, and that those which enter are to be destroyed or rendered inactive; and, in conclusion, I invite your attention to a brief statement of what may now be regarded as necessary in the way of prophylaxis in private practice.

Filth implies decomposition and invites the presence of septic germs. Hence we are called upon to promote cleanliness, in every manner and in all directions, regarding the patient herself and her surroundings. Her body and especially her genitals should be made and kept clean, throughout the labor and subsequently. The soiled personal and bed clothing should be changed as soon as possible, and at once taken from the chamber. All utensils and instruments should be kept scrupulously clean, disinfectants being employed for everything that is brought into contact with the genitals. Proper contraction of the uterus should always be promoted by manipulation, by ergot and other means. It is important, too, by means of compresses, or in other ways, to secure such a position of the uterus that there will be no obstruction to the exit of the lochial discharge, and, in this connection, it may not be out of place to remind you that the emptying of the bladder should be secured at proper intervals, and that defecation usually requires attention on the third day. At the onset of labor, an enema is required for various reasons. The vulva should frequently be bathed, preferably by a wad of absorbent cotton or charpie which has been soaked in a disinfecting or antiseptic solution. After a tedious or laborious labor, or when artificial or instrumental delivery has been necessary, it is important to give a vaginal douche of a hot disinfecting fluid, which should be extended within the uterus if its cavity has been entered

by the hand or by instruments, and, also, if a putrid child has been born. While it may not be required in all cases, I believe a hot vaginal douche promotes contraction of the uterine and vaginal tissues, empties the cavities of the clots which may have accumulated and affords comfort to the patient. Perineal lacerations should be united, in order to avoid the exposure of extensive raw surfaces to the action of the germs. After the completion of the labor and while the physician's attention is directed to other matters, a napkin or towel, wet with the disinfecting fluid, should be placed against the vulva. Finally the toilet of the patient is to be made complete, all soiled clothing removed, and the vulvar napkin applied.

In the hospital, following nearly the method of Garrigues, we employ a specially prepared antiseptic pad, which is fully described in Dr. Richardson's paper. As a matter of fact, it is quickly and easily made, is inexpensive, and, we believe, it is an efficient protective, but probably for general use other pads may be equally serviceable, and I frequently use one composed of a layer of borated or sublimated cotton, enclosed in cheese cloth or any similar material. These are changed frequently, and, of course, destroyed. Whenever the vulva and adjacent parts are exposed for any purpose, they are to be thoroughly cleansed with the disinfectant.

The same rigid rules as to cleanliness and disinfection must be enforced upon the nurse, who should be required to be tidy in her person and attire, preferably, of course, dressed throughout with materials which may be washed. She should keep her hands and finger-nails scrupulously clean, and should be instructed never to touch the patient's genitals without first having dipped the hand into the disinfectant and always to exercise extreme care with regard to all utensils and instruments which she may have to use with the patient. Especial precautions devolve upon her if she has just come from attendance upon a patient with zymotic or contagious disease.

The physician, too, should be governed by the same rigid rules with regard to absolute personal cleanliness and disinfection of the hands, in digital examinations and all operative procedures. If he has been in recent attendance upon acute, infectious or contagious disease, or in immediate contact with decomposing, cadaveric material, he is bound to exercise the utmost precautions, especially in avoiding the conveyance of germs to the genital tract, by the most careful attention to the hands and finger-nails.

Properly these rules are to be observed throughout the lying-in period, but especially are they required during the first week; and, in all cases, while providing for proper ventilation of the chamber, it is required, as a matter of prime importance, that sewer gas should be excluded absolutely from the chamber. Whether this is deleterious because it is pervaded with bacteria which are related to septicæmia, or whether, in some way, its inhalation makes the patient more susceptible to the action of the germs, are points which have not been determined.

It is claimed by many that an efficient prophylaxis may be attained by more simple methods; that pure water and the ordinary measures for promoting cleanliness are sufficient to render the patient aseptic. Surely this is not true of our hospital, where, as I have already stated, the gradual improvement kept pace with the approach to our present mode of treatment, and many of us have good reasons for knowing that septic cases occur not infrequently in private practice where such simple measures only have been employed.

With regard to the best disinfectant to be used, all experience tends to emphasize the value of corrosive sublimate in solution for general use. It is inexpensive and easily carried about in the form of tablets. Owing to its corrosive action upon metals, carbolic acid or other agents need to be employed to disinfect instruments and metallic utensils. Iodoform is a valuable agent for many

purposes, but its persistent odor forms a serious objection to its continued use, especially externally. For anointing the fingers and filling the spaces beneath the finger nails, carbolated vaseline is suitable, though in the hospital we use a cerate containing eucalyptus oil. For douches, the bichloride solution offers at least one great advantage, in that it has been shown that very weak solutions sterilize the germs, and that a prolonged contact is not required. Cases of serious symptoms from mercurial poisoning have been reported, when employed in the treatment of septicæmia, but it is more than probable that, in all these instances, either the solution used has been too concentrated or the contact with denuded surfaces has been too much prolonged, or else due care has not been taken to provide for the immediate escape of the injected fluid. Possibly, too, in some instances, the individuals have had an unusual susceptibility to its action. For my own experience, both in hospital and private practice, I have never had occasion to regret its use, and I do not recall an instance in the practice of others where its employment *in prophylaxis* has been the cause of any injurious effect.

It is probable that other antiseptics,—and very many have been recommended,—may be equally effective in producing asepsis, at least in private practice; but the sublimate solution appears, on the whole, to be the best. At all events, the principle remains whatever agent may be employed.

I have already alluded and replied to the objection, made by many physicians, that the routine methods herewith described are quite unnecessary, outside of hospitals. To those of you who have taken this ground, permit me to say that the requirements of adequate aseptic midwifery add but little to your duties or to those of the nurse. There is nothing complex about the rules, to understand and apply which calls only for ordinary intelligence, and

this, at least, any one should possess who ventures to assume the responsibilities incident to presiding at the birth of human beings.

