SEPTIC ABORTION*

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An abortion is the interruption of pregnancy before the child is viable. The term premature labour should be used to designate those instances where pregnancy terminates before maturity but after the child has a chance to live. In scientific description it is better to discontinue the use of the term "miscarriage," which is used by the laity to apply to the interruption of pregnancy at any period before full term.

A septic abortion will have the same suggestive clinical manifestations as an a-septic one, with the addition of the findings associated with an infective process. At times this infective process may arrest or modify the symptoms which we consider to be the characteristic phenomena of abortion. Then, again, evidence of contamination may appear at any stage of the abortion process and even after its completion, depending upon the time infecting organisms entered the body and also upon the dormant period of these organisms.

Causation. Abortion is brought about by causes associated with either the fœtus or the mother. Disease or malformation of the fœtus or its appendages may result in its expulsion. In the mother, syphilis or other infectious disease, toxæmia of pregnancy or toxæmia from anæsthesia, alcohol and drugs; mental disturbance, abortifacients, local pelvic disease, particularly chronic endometritis and malpositions of the uterus, are all possible and frequent causes of abortion. The greatest etiological factor is, however, criminal interference either by the pregnant woman herself or by the abortionist. Of fifty-one women attended by me during abortion, twenty-two admitted criminal interference. This percentage of forty-three would have been materially increased if all the patients had been equally frank.

The process may be rendered septic in two ways, speaking very broadly: the infection may have its origin within the body of the patient, or on the other hand it may be introduced from without. Polak (1) regards the uterus during involution as a wound. Certain it is that when the placenta or decidua separate from the uterus a wound is the result. This wound is bathed in blood and forms at once a splendid culture medium as well as an avenue of entrance for any bacteria which may reach this situation. It is possible that the organisms may be carried in the blood from a focus of infection remote from the pelvis. The teeth sockets, the tonsils, the accessory nasal sinuses, the gall bladder, may harbour bacteria which often escape into the blood stream. It is possible that the puerperal wounds may thus be infected endogenously. Every writer on this subject suggests this method of infection, but satisfactory clinical and laboratory proof is lacking. The role played by focal infection in the production of toxæmias of pregnancy has long been suspected. Recently Talbot (2) from a clinical study of the placenta finds evidence of blood-borne infection in that organ. Rosenow (3) in his study of the elective localization of bacteria in certain lesions found that when a pregnant rabbit was used in the experiments the lesions were produced in the fœtus of the same character as those in the parent rabbit. Infectious infarcts in the placenta and infections produced in the fœtus go a long way toward establishing the possibility of the infection of puerperal wounds by blood-borne organisms. Further work along the lines indicated by Rosenow (3) ,(4) will doubtless solve this problem. There is, however, a method of autoinfection about which it is not necessary to speculate. Latent or active infective processes may be located within or in close proximity to the genital tract. The vagina under ordinary circumstances contains a varied bacterial flora which although apparently innocent there, if carried to the fresh wounds above may set up a serious infection. Many suffer from leucorrhœa from chronic infection of the cervical or vaginal mucosa, or of the deeper glandular elements of the cervix or vulva. The presence of the gonococcus in the vagina is a more serious circumstance. All are familiar with the tragic sequence of events which frequently follow abortion or labour in those who suffer from gonorrhœa. If

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the patient's life is spared, years of suffering are probably ahead of her, with sterility and mutilating operations in addition. Certain authors stress the importance of the male fluid in the vagina as an important factor in the causation of infection. Bathing has also been held responsible for the entrance of germs into the birth canal to infect puerperal wounds.

Autoinfection is, doubtless, assisted by the general condition of the patient, she being often particularly susceptible to infection from the severe anæmia and shock of the abortion or from some concurrent condition.

The introduction of infected material from without is, however, the cause in the great majority of cases. DeLee (5) considers it to be proper in all cases of septic abortion to suppose that the abortionist has been at work. Most authorities agree that a very large proportion of these cases are due to the work of the abortionist or to the patient herself. In the author's series of thirty-one cases which forms the basis of this study, fifteen of the patients admitted criminal interference. The abortionist does not make adequate preparation of the parts, the hands, or the contrivances. The work must, perforce, be done secretly, which presages the fact that the operation is undertaken without assistants or proper preparation. The abortionist must have no witnesses to his deed. Holmes of Chicago holds that all criminal abortions should be treated as septic until the clinical course proves otherwise. The abortionist is realizing the importance of asepsis as is evidenced by the fact that of twenty-two cases of admitted criminal abortion in my series, seven did not become septic.

Regrettable as it may seem, the physician or nurse may be the party responsible for the infection. Unclean hands, faultily prepared dressings, packing and instruments, or carelessness in the toilet of the patient may be the causative factor. In this connection the proximity of the orifice of the bowel must ever be regarded as a potential danger, and all means taken to prevent material from the bowel entering the genital tract. This is perhaps more important in labour at maturity, where the advance of the presenting part expresses from the bowel material which may reach the inevitable wounds caused by the trauma of birth. Bonney (6) gives it as his opinion that too little attention is given in all obstetrical procedures to the isolation of the anal region from the field of operation, and perhaps too much stress given to the possibility of infection from without. An improper technique may be responsible for the transplanting of bacteria from the vagina or vulva to a higher position in the genital tract, where they have an opportunity to invade. In infected cases one should bear in mind that the patient may be infected by one organism in pure culture, and that in order to prevent a mixed infection the preparation and technique must be just as thorough.

Symptoms. Added to the phenomena of abortion will be noted a rise of temperature often preceded by a quickening of the pulse. If all cases of abortion are put on a two-hour pulse and temperature chart one is frequently able to discover that all is not well with the patient long before she has symptoms. Throughout the disease the pulse is a more reliable guide to prognosis and treatment than the temperature. A rising pulse rate unless associated with a corresponding rise in temperature is an ominous sign. The temperature may rise to 105 or 107 and fall as suddenly. In other cases it may show a steady daily rise; and in still others it may never go above 101, even although some of such cases may terminate fatally. The temperature does not indicate whether the infecting organism is a benign saprophyte or a virulent streptococcus. One's equanimity need not be much disturbed if the pulse rate remains low, even when the temperature is very erratic. Chills and chilliness are usual. Repetition of chills indicates fresh invasions. Pain is usually not complained of until the peritoneum is reached except in cases of acute congestion of the pelvic organs. An increase in the white blood count is usual, and Polak (7) uses this symptom as his indication for surgical interference. In the writer's series it was noted that in four patients severely ill there was a leucopenia. One of these died.

Lochia. Over and over again it has been stated that because there was no odour to the lochlia that there was no infection of the genital tract. As a matter of fact, in streptococcic infections it is extremely characteristic for the normal musty odour to disappear. In sapremic infection the lochia is usually very offensive and profuse. A scanty discharge without odour leads one to suspect that he is dealing with a systemic invasion by the streptococcus or other organism.

Diagnosis. The fact of a septic abortion is determined by exclusion as in the diagnosis of any other pathological condition. Any one of all the conditions manifested by a thermal course may either be the cause of the abortion or con-

current with it. It is the height of folly to attempt any radical treatment until it is definitely and positively determined that the illness is due to infection within the pelvis. Holmes of Chicago states that while on the abortion committee of the Chicago Medical Society he had opportunity to observe many instances where cases came to autopsy with a diagnosis of death from puerpural sepsis and in which the pathologist discovered no evidence of pelvic disease but did find such conditions as pneumonia, brain abscess, and acute abdominal conditions. One should be loath to discourage thoroughness in diagnosis, but little if any good so far has resulted from the identity of the infecting organism. If the blood culture shows a growth the prognosis is more serious, but whatever germ is found the treatment remains the same, most authorities being frankly pessimistic in regard to vaccine or serum therapy in this condition. One cannot help feeling that in this direction lies truth; but let us leave it to the trained path-finders to show us the way, and let us not follow the many "will o' the wisps" which in such distracting profusion would lure us from the thoroughfares of sound therapeutics. An admission of gonorrhœa or the possibility of infection by the gonococcus is however an indication for bacteriologic examination of the discharges, as the presence of this organism is a mandate to leave the woman severely alone as far as local treatment is concerned.

Prognosis. Nature attempts and usually succeeds in limiting the process by means of an enveloping reaction zone. This may vary from a superficial infiltration of the endometrium with white blood cells to a very extensive inflammatory process deep in the tissues. When the infecting organism is virulent there is apparently no time for nature to complete her protecting wall. In such cases at post mortem there is often astonishingly little evidence of tissue reaction, and the necrotic layer lining the uterus where the infection entered may be entirely absent. This white lining of the uterus is found in most cases of septic abortion and indicates nature's effort to repel the invader at the threshold. Prognosis will be influenced by the virulence of the infecting organism and by the dosage, the immunity, and general health of the patient, and upon the treatment she receives. It also seems logical to suppose that a woman whose pelvic organs were healthy previously will do better than one who has chronic disease there. That treatment avails much is doubted; but let us at least refrain from increasing the helpless woman's difficulties by ill-advised interference.

Treatment.

Prophylaxis. The best treatment of any condition is its prevention. Abortion can be prevented in most cases. To the public health worker we freely offer our tribute of praise for his magnificient accomplishments along many lines. The reduction of infant mortality, the control of venereal disease, the improved living conditions in the homes of the people, and the reduction of the death rate from infectious diseases are results due to the tireless efforts of the physicians charged with the administration of public health affairs. The prevention of abortion is a phase of their work which has as yet received very little serious attention, and any activities undertaken have not been pushed with vigor. The birth rate would be very materially increased if the slaughter of unborn children could be prevented. Many women are losing their lives and many others becoming economic burdens through chronic invalidism following abortion. DeLee (8) says that prognosis as to health is worse after abortion than after labour at term. To give a personal experience, I have attended during a certain period three hundred and fourteen women in labour at term, while during the same period I was called to fifty-one cases of abortion. Thus over fourteen per cent. of my cases aborted. This experience will no doubt approximate that of others, and will give an idea of the serious loss of life from this cause. A great deal can be done to prevent the condition and the following suggestions are put forward for consideration.

The influence of wide publicity has long been recognized as an effectual method of bringing about reform. One need only refer to the campaign against venereal diseases which has made everyone acquainted with these conditions, and by public co-operation has enabled the health authorities to get them under control. A similar campaign in which cold facts about this condition are given the widest publicity, the statistics quoted, the causes of abortion enumerated, and expectant mothers counselled to put themselves under medical supervision at once, would most surely result in a marked reduction in the number of cases. The mere publication of the Criminal Code of Canada as it pertains to abortion could not help but have a deterrent effect on those guilty of improper practices. Its penalties are generous. Life imprisonment is prescribed for

one who administers drugs or uses means to produce an abortion. If the woman herself is guilty the penalty is seven years' imprisonment. The most significant section reads as follows: "Everyone is guilty of an indictable offence and liable to imprisonment for life who causes the death of any *child* which has not become a human being in such a manner that he would have been guilty of murder if such a child had been born." The moral conscience of the public, including that of some physicians, needs educating, and it should be some one's business to make it known that from conception the unborn child is a human creature whose destruction is the equivalent of murder. If the public were in possession of all the facts they would join in hunting down criminal abortionists as they do in the case of other malefactors. At present they flourish and enjoy a certain immunity owing to the apathy of the public toward their crime.

The medical profession has also a duty in this connection. Evidence against the criminal abortionist is often obtained, and while the violation of the confidence of patients is not to be considered it is possible by discreet communications to the local officers of justice to rid the community of the obnoxious person.

The medical man himself should shun the very appearance of evil. Sympathy with the unfortunate woman who for any reason finds the circumstances of pregnancy a hardship should never cause him to suggest that it were better that her pregnancy be terminated. She would probably seize upon this suggestion and use it to salve her conscience in further search for help. A firm, tactful refusal from her family physician will in most cases put the idea out of her head.

To make it more difficult for a woman to operate on herself it should be enacted that druggists are not to sell without a physician's order such articles as male catheters and sponge tents. Ergot, cotton root, and other emmenagogue compounds should similarly be withdrawn from sale except when prescribed. Slippery elm which was used in two of my cases would make just as good tea if the druggists were required to cut it up into small pieces before offering it for sale.

The registration of the birth of a "child" at any stage of pregnancy would have beneficial effect. It would insure that proper statistics were obtained and the seriousness of the loss of life from this cause would be known. It would also be a decided check on the criminal cases.

The prenatal care received by most pregnant women is practically valueless. Many do not see the doctor until he comes to attend them in labour. Others go to "engage" him and see him no more until labour. The doctor may ask for samples of the urine, and he may not. A maternity engagement should be considered a serious matter. The patient's history should be carefully taken and a complete physical examination made on her first visit. The blood should be examined in every case. The urine should be examined and the blood pressure taken every two weeks throughout her pregnancy. The woman should be instructed in the care of her body during her pregnancy and should be taught to recognize the abnormal indications and to seek help when they appear. All this will take time and to the busy practitioner it may not seem very necessary. The satisfaction of preventing one abortion or of saving one woman from eclampsia will amply repay one for much routine work. An engine driver who refused to watch for his signals would not be considered a safe man to pilot the engine, and an obstetrician who does not watch his patient carefully for the onset of difficulty is likewise unfit for his work. Then again, the public are slowly becoming educated to the importance of prenatal care, and the practitioner who fails to satisfy in this regard will be passed by in favour of his more conscientious brother. Of course it is understood that this prenatal care must be properly recompensed, and for those who cannot pay for the service, prenatal clinics should be established in every centre where this care can be obtained without cost.

Treatment. The treatment of septic abortion may be: (1) Radical—operative; (2) Conservative—expectant. In increasing numbers the leading authorities in obstetrics are becoming exponents of the latter method. He who would curette, douche, or practice any of the methods of intra-uterine therapy as a routine will lose more patients than he who treats his patients purely expectantly. Williams (9) one of the earliest advocates of conservative treatment, had a mortality of 4.35 per cent. in 1899, while his contemporaries were treating their patients actively with a mortality as high as 30 per cent. Hillis (10) reports an interesting study at Cook County Hospital, Chicago. In order to test the efficacy of the two methods of treatment and to reach a definite conclusion, a clinical test was made. Women brought to the hospital suffering from septic abortion and with a temperature of over 100 were assigned alternately to active and to

conservative treatment. Those on the active list were immediately curetted. The figures were as follows:

	Active	Expectant
No. of cases	100.	100.
Days of fever	810.	350.
Average days of fever	8.1	3.5
Total days in hospital	1328.	848.
Average days in hospital	13.28	8.48
Complications	19.	4.
Deaths	3.	1.
Percentage mortality	3.	1.

In my series of thirty-one cases of septic abortion, one only was treated actively and this patient died. In her case criminal interference was admitted, and after a long period of expectant treatment the uterus was curetted owing to the continuance of a fairly brisk hæmorrhage. Her temperature before operation did not rise above 100 but did not continue normal. She also vomited occasionally. The curette should not have been used. Packing would have emptied the uterus without as much danger. Thirty-six hours after operation she had a severe chill with an acute rise of temperature. She died in four days with acute bacteremia. The thirty cases treated expectantly recovered promptly with the exception of one who developed a double salpingitis and in whose case a history of gonorrhœa was obtained.

Operative treatment by curettage, digital removal, tamponade, and douches is in each case open to the same objection. It is ineffectual more often than not failing to remove the products of conception, and is in itself a source of danger. The curette is especially harmful and it is doubtful if a thorough curettage of the uterine cavity was ever done. Its configuration is such that it is impossible for the scraping edge to cover more than half the surface. It is true that gross particles may be removed, but it is never possible to be sure that the uterus is empty.

Many authors report cases in which pregnancy has gone to term after what was thought to be a thorough curettage of the uterus. A few weeks ago I was associated with a skilful obstetrician in a case of pernicious vomiting of pregnancy. Interruption of pregnancy was the decision of counsel. My colleague dilated and packed with gauze. The patient did not abort. She was again anæsthetized and curetted. It was thought that the products of conception were removed completely. Some days later she passed a large decidual mass. Besides being an ineffectual instrument it is a dangerous one. Perforations are frequent with its use. The soft friable uterine wall may give way under the gentlest movements of the curette. The most formidable objection to its use in cases of septic abortion is that even with the dullest instrument and the softest strokes new wounds are made and the spread of the infective process is likely to result. DeLee says "My experience has taught me that the traumatism of curettage, digital or instrumental, may be fatal—a superficial and not dangerous infection being converted into one with strong invasive qualities." If the symptoms are due to infected uterine contents, nature can usually be relied upon to empty the uterus in due course. Their retention in the uterus can do no harm. The organisms in the mass may be leading what is practically a saprophitic existence. To employ an instrument to remove them may give these organisms an opportunity to actively invade. Fothergill (11) speaks of using the curette before the pathogenic organisms have entered the blood stream. If the infection is due to a virulent organism it is far beyond the reach of the curette by the time symptoms appear.

The following is the treatment suggested: The patient is put to bed in the Fowler position, seated upon a sling pillow. She is better in a hospital, where she can receive skilled care and be shielded from visitors and annoyances. She should be put on a two-hour pulse-temperature chart. Water and nourishing fluid diet should be given in abundance. The bowels are opened by enemata and gentle laxatives. An ice bag is placed over the lower abdomen. If fluid is not taken freely by mouth glucose or saline solution is given per rectum; or if not tolerated there, by subcutaneous injection. Appropriate stimulation is given if required. Ergot or pituitin are used to keep the uterus in contraction. This probably blocks lymphatic channels. Quinine is often useful to remove retained products of conception. After the temperature has been normal for five full days and the uterus is not empty, the contents should be removed. The patient's return to health is thus expedited.

Should hæmorrhage have to be reckoned with during the course of septic abortion, the following procedure is recommended: With the patient prepared for operation, with plenty of assistants and if possible without anæsthetic, pass the largest sized tubular cervical speculum that can be got in and through it pack weak iodoform gauze with

blunt dressing forceps. Then about the cervix pack sterile cotton layer upon layer until the vagina is full. In twenty-four hours the packing is removed and with it is usually found the products of conception.

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OBSERVATIONS ON THE VALUE OF LUMBAR PUNCTURE

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LUMBAR puncture has long been recognized as a measure not only of great diagnostic value, but also of considerable therapeutic benefit. The information derived from the examination of the spinal fluid, and the relief experienced on its removal, is, we believe, greatest in the acute inflammatory conditions, such as septic meningitis and epidemic cerebro-spinal meningitis. To these we may add also the tuberculous meningitis. Our present laboratory methods enable us in these acute conditions to make a diagnosis so easily that it would seem little could be added from the laboratory standpoint.

The varied characteristics, however, of the spinal fluid in certain more or less obscure cerebro-spinal conditions and their relation to the blood findings in the same patients, seem to be sufficient excuse for the presentation of a few figures, gathered from the study of 130 examinations of the spinal fluid made in connection with the work of the medical departments of the Montreal General Hospital and the Western Hospital during the past four and a half years.

Laboratory methods for estimating increase in the number of white cells, or increase in the amount of globulin, have become very accurate, and have enabled us to detect the slightest evidence of acute or chronic inflammatory reaction. Add to these tests the serological reactions, and we have further enhanced our methods of diagnosis. In spite of all our tests, however, the clinician may at times find great difficulty in arriving at a definite conclusion in cases showing symptoms of lesions of the central nervous system or cord, in fact at times he may not only be helped *little*, but may actually be *misled* by the laboratory findings.

This study has been confined to conditions, for the most part, purely medical, or cases met with in the medical wards and outdoor clinics. It consists of observations on the spinal fluid findings in cerebral hæmorrhage, cerebral thrombosis, cerebral lues, encephalitis lithargica, poliomyelitis, brain tumour, brain abscess, tabes dorsalis, myelitis and so-called meningismus. The findings have been of interest not only from a medical and a scientific point of view but also from a medico-legal aspect. Several cases have come under observation in which a definite diagnosis was necessary, in that men have taken actions in law courts to recover damages for disabilities which they attributed to accident. Others have arisen in which the obligation to pay insurance was questioned by the company.

Here may be cited two illustrative cases:

R. S., male, age 38, employed as a laborer, fe