TREATMENT OF PUERPERAL SEPSIS*

BY

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There is a tendency, when considering the question of puerperal sepsis, to get away from broad surgical principles and to lay undue stress upon some such occasional factor as droplet infection. This is apt to confuse the issue. Parturition takes place through a germ-laden area, and is accompanied by wounds which, from their inevitability or frequency, might reasonably be described as physiological. The placental site is laid bare in 100 per cent. of cases, the cervix is lacerated in at least 80 per cent. of primiparae who have a spontaneous delivery, and is lacerated as far as the vault in a few of them. The lower vagina and perineum show wounds of varying degree in roughly 80 per cent. of primiparae, and bruising in a number of others. A healthy primipara, having a normal labour, is exposed to a potential risk. Few fortunately suffer—an indication that a general and local immunity has mercifully been provided to meet the occasion. It is only when the balance is adversely upset that sepsis occurs.

It is a commonplace that debility, pre-existing septic foci, kidney disease, loss of blood, and exhaustion render an individual prone to infective processes. It is well recognized that wounds, particularly if bruised, lacerated, or neglected, expose the patient to special risk. The wound of the placental site cannot be prevented, although it can be safeguarded after manual removal of the placenta by an antiseptic intrauterine douche. Cervical lacerations can certainly be increased in severity by faulty technique, but their repair after a confinement is not advisable. Lower vaginal or perineal wounds are almost inevitable, in a primipara, but their severity can be considerably modified by careful technique. These last are nearest infection, and are most accessible to surgical repair and after-care. Those higher up—and especially the placental site—must in large measure be left to the resistance of the patient to protect. It is obvious that we must counteract all factors which undermine a patient's general and local resistance before, during, and after delivery, and must pay special attention to the repair and after-treatment of wounds of the lower vagina and perineum.

SURVEY OF CASES

A study of primiparae admitted to the Princess Mary Maternity Hospital, Newcastle-upon-Tyne, during a period of six years, proves that, until the problem of sepsis in general has been solved, real advance will only be achieved by better midwifery. The cases were divided into two classes: (1) cases for which the hospital was primarily responsible; (2) cases sent in by doctors. These were further subdivided into groups A, B, and C.

Group A consisted of normal cases which had a spontaneous delivery (or were delivered with forceps) whether lacerated or not.

Group B included all cases whose general resistance had been lowered by albuminuria, loss of blood, diabetes, and other non-infective conditions, and those whose local resistance had been endangered by minor degrees of pelvic contraction, internal versions, breech deliveries, induction of premature labour, placenta praevia, manual removal of the placenta, and so on. Many had lacerations.

Group C were cases delivered by Caesarean section, usually on account of contracted pelvis, but also for other conditions.

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The only primiparae excluded from these observations were those with a pre-existing septic focus, such as vaginitis, pyelitis, boils, and also a few who died soon after delivery (within ten days) from eclampsia or heart disease, and had not time to manifest a pyrexia; if they did, and it was due to sepsis, they were included. The diagnosis of sepsis was based on a notifiable temperature not due to an extragenital focus.

Hospital : Group A (2,480 Cases)

Sepsis developed in 127 (5.1 per cent.). A study of these cases from the point of view of lacerations and forceps deliveries showed that both were more frequent among the febrile cases.

	Afebrile Per cent.	Febrile Per cent.
Lacerations	79.6	88.8
Forceps	17.4	35.5

There is usually more exhaustion and tissue resistance with resultant trauma associated with a "forceps" case than with a spontaneous delivery, unless the application of forceps has been merely a matter of convenience. During the first three years the system of isolation was imperfect, and clean, suspect, and septic cases were in contact. This system was radically changed during the second three years, and the results testify to the beneficial effect of the segregation and better nursing of clean cases.

Old routine	6.7 per cent. sepsis
New routine... ..	3.6 per cent. sepsis

The improved results during the second three years could not reasonably be explained by any marked alteration in the number of those lacerated or the frequency of forceps deliveries. This was studied in relation to the septic cases during both periods. Forceps were applied in 34.6 per cent. and 35.5 per cent. respectively, and lacerations were present in 92.5 per cent. and 82.2 per cent. respectively during the two periods.

Hospital : Group B (524 Cases)

Sepsis developed in sixty-six (12.6 per cent.), roughly double that of Group A. A comparison of the results found in these more sensitive cases in relation to the improved conditions in hospital was striking:

	Sepsis Per cent.	Lacerated Per cent.
Old routine	20	84
New routine	5	79

The main weight of the evidence to date would support the demand for better nursing and better organization of nursing service.

"Doctors' Cases" : Group A (286 Cases)

These were sent in usually with a diagnosis of prolonged labour, contracted pelvis, unsuitable home conditions, and "failed forceps." They delivered themselves spontaneously, or were assisted by forceps. Forty (13.9 per cent.) were septic, as compared with 5.1 per cent. in hospital practice. It is impossible to overlook the fact that fifty cases had already had an attempt made at delivery with forceps, prior to being admitted, some of the failures being due to premature attempts at delivery, and others due to failure to recognize occipito-posterior presentations.

"Doctors' Cases" : Group B (403 Cases)

Sixty-five (16.1 per cent.) were septic, as compared with 12.6 per cent. in hospital. Of the 403, seventy-eight were cases with minor degrees of pelvic contraction, on twenty-one of whom attempts at delivery with forceps had been

made prior to admission. These cases are already known to be more susceptible to infection, and it seems reasonable to believe that the delay and attempts at delivery would still further lower their resistance, both local and general.

Caesarean Section

The total of 213 cases under this heading was divided up as follows:

Hospital cases ... 109. Septic 23 = 21.1 per cent.
"Doctors' cases" ... 104. Septic 44 = 42.3 per cent.

Of the 104 cases sent in by doctors, most of which were in labour when admitted, there were seventy-one cases of pelvic contraction, in thirty-six of which attempts had already been made at delivery with forceps. The possibility of additional trauma being produced by the forceps is suggested by the fact that forceps had been applied in 14.6 per cent. of the afebrile cases and in 53.3 per cent. of the febrile cases. It must be admitted that there is scope for improvement in obstetrical diagnosis and practical midwifery so far as the profession is concerned.

Analysis of Groups

Comparison of the various groups gives the following results:

	Morbidity Per cent.	Mortality Per cent.
<i>Group A</i>		
Hospital cases ...	5.1	0.08 (2 deaths)
"Doctors' cases" ...	13.9	0.35 (1 death)
<i>Group B</i>		
Hospital cases ...	12.6	0.38 (2 deaths)
"Doctors' cases" ...	16.1	1.5 (6 deaths)
<i>Caesarean Section</i>		
Hospital cases ...	21.1	0.91 (1 death)
"Doctors' cases" ...	42.3	7.6 (8 deaths)

Before discussing the significance of the foregoing observations it might be noted that of 153 primiparae who were admitted during the six years in question on account of puerperal sepsis, and with a notifiable temperature at the time of admission, 68 (44.4 per cent.) were recorded as having a septic perineum. In a number of others the major condition of septicaemia, pyaemia, or peritonitis was specifically recorded. In some it was noted that the wounds had not been repaired. A total of twenty-six died (16.9 per cent. mortality). In some of the acute cases admission to hospital was within a few days of delivery, and the majority had been delivered 7 to 14 days. Cases of recent acute sepsis in primiparae will invariably show definite evidence of wound infection in the lower vagina or on the perineum. In some cases the wounds are of the concealed type.

GENERAL CONSIDERATIONS

If the subject is viewed in terms of general and local resistance and the need for maintaining both at the highest possible standard, there is abundant food for thought and most obvious room for improvement.

Ante-natal care can reduce considerably the number of Group B cases, and if they cannot be prevented then much can be done to safeguard their resistance to infection by medical measures or appropriate obstetrical procedures. It also prevents cases of gross pelvic contraction being discovered for the first time during labour. Good nursing assistance prevents false calls and ensures a better supervision of labour, and is of prime importance during the early days of the puerperium. Individuals and groups of individuals get the most excellent results under the most difficult conditions, but the best results on the average will be obtained in the case of patients who are under the joint supervision of a general practi-

tioner obstetrician and a competent midwife. Patients sent in by doctors are, in many instances, cases which they have not seen until called in by a midwife, when, especially in the case of minor degrees of pelvic contraction, decisions are difficult. On the other hand, the most careful doctor may have to depend for the after-care of his patients on handywomen, or an individual midwife or district nurse, who has numerous other patients to attend to. Until the nursing service in this matter is properly organized many of those cases which are threatening to go septic simply cannot be adequately treated. The admission to hospital mainly benefits the patients by the better nursing which is obtained.

As regards general treatment, fresh air, avoidance of effort, cold sponging for hyperpyrexia, an assimilable diet, and a citrate mixture are some of the simpler adjuvants. Sleep should be procured, and the bowels kept regular. Anti-scarlet-fever serum 10 to 15 c.cm. repeated on one or two occasions appears to be more beneficial than polyvalent serums. It is sheer waste of serum if at the same time active measures are not directed to perineal and vaginal wounds. The best local treatment consists of swabbing with 10 to 20 vol. peroxide, followed by a jug douche of boric, eusol, or weak lysol lotion every three or four hours. Similar treatment, but in the form of douches, should be adopted if there is proof of vaginal infection. Intrauterine treatment, apart from a preliminary douche, or the gentle removal of gross retention of products, is best left for the patient's general resistance to deal with. Attempts to hunt for small shreds of membrane may, even in the most competent hands, disseminate the sepsis, and with rare exceptions they should be avoided if a septic process has started.

The importance of droplet infection is overstressed. The bacterial content of the average vagina, and the proximity of the unguarded anal and urethral orifices, make the wearing of masks by doctors and nurses engaged in this work obviously not the solution of the problem. This matter has been investigated on two occasions at the Princess Mary Maternity Hospital. In 1929 the reorganization of the hospital resulted in the septic morbidity percentage for clean cases, Group A and B, including primiparae and multiparae, being reduced to 1.4 per cent. This standard was maintained for two months. During this period 68 per cent. of the nursing staff and students in residence were reported to be carriers of haemolytic streptococci. In spite of this, all precautions were *deliberately* abandoned, and neither masks nor gargles were allowed. Out of 183 clean cases delivered or dressed by this infected team, there were only three trifling and transitory notifiable pyrexias believed to be due to sepsis. A further test has just been concluded which was made possible by the courtesy and interest of Dr. Charles, medical officer of health for Newcastle, and carried out by Mr. Frank Stabler. Out of fifty-one nurses and students swabbed, nine were carriers (17.6) per cent. The carriers delivered forty-seven clean cases and dressed a number of others. No masks were used nor gargles employed.

During the two months' test 180 clean cases were dealt with, and three developed trifling and transitory pyrexias, one of which was due to breast inflammation, and one was in a case delivered by a non-carrier. In brief, the joint tests involved 363 clean cases, delivered and dressed by a team of nurses and students with a marked potential risk, who were, moreover, taking no precautions in that respect. Five patients (excluding the case of breast inflammation) developed transitory pyrexias believed to be of septic origin. But for strict temperature charting several of them would have been overlooked, and not one of them would have caused a

doctor any anxiety. Obviously, if a doctor or a nurse has a severe cold or a bad throat they are a danger to everyone with whom they come in contact, whether pregnant or non-pregnant. There are also elementary rules regarding coughing and sneezing which it is hoped need not be laid down as exclusively obstetrical.

CONCLUSION

1. The obvious lack in the present system is good nursing, and the carrying out of those antiseptic and aseptic principles which good nursing implies.

2. Next in order comes lack of ante-natal care, which is bound to persist until doctors, and especially those keen on the work, are called in by their patients in the first instance, and not by midwives.

Lastly, until Items 1 and 2 above are corrected, errors of judgement and technique are bound to be made, which in print seem so regrettable, but which to anyone with a practical knowledge of obstetrics, especially in industrial practice, are, under present-day conditions, in many cases not only understandable, but even excusable.

THE CONTROL OF SCHOOL MYOPIA *

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As a descriptive term the name "school myopia" leaves little to be desired. It well conveys the fact that in a large group of children myopia makes its appearance in school life, generally at about the age of 11, and steadily progresses for a few years. The implication that the school is responsible for this process is, however, an assumption of considerable antiquity, for over 300 years ago Kepler first pointed out that short sight is more common among students and others who use their eyes excessively. Attempts to control school myopia have been largely based on some theory or other as to the origin of myopia. On conflicting views as to the role of accommodation in the development of myopia, under-correction and full correction of the refractive error, as also treatment by atropine or eserine, have found their exponents. Tenotomy of the internal recti has been practised by those who see excessive convergence as the responsible factor, and even tenotomy of the oblique muscles has been advocated by those to whom the myopic eye is an eye compressed by a low orbit. Iridectomy to obviate a hypothetical increased intraocular tension causing myopia has been carried out, as also has repeated paracentesis of the anterior chamber. Complete bodily rest has had its advocates, but so too have general exercises and massage of the globe. All sorts of postures to be adopted when doing near work, and all sorts of appliances to aid these postures, have been in fashion at one time or other. Subconjunctival injections of salt solutions of varying concentration, dionine, and adrenaline have all been employed, whilst of recent years radium has been brought forward as a means of cure. But it is mainly along the lines laid down by Hermann Cohn in 1867, and subsequently, that attempts at controlling myopia have been carried out. Cohn and his successor saw myopia as the result of too much close work, and they advocated hygienic measures to minimize the evils induced by excessive use of the eyes. Good illumination was needed in order to avoid unnecessary close application, with its consequent excessive accommo-

dation and convergence; furthermore, stooping over work, which was held to produce congestion of the eyes and raised intraocular tension, could also be thus obviated, especially if the light was suitably distributed over specially constructed desks and benches. The elimination of Gothic script and the use of well-printed books was likewise a corollary of these views. At the same time the advocates of these opinions stressed the necessity of general hygienic measures. Cohn pleaded for school medical services, and, whatever be the ultimate value of his ideas on the causation of myopia, his work will always remain as a pioneer effort in school hygiene.

FIFTY YEARS OF ATTEMPTED CONTROL OF MYOPIA

Over half a century has now elapsed since Cohn's advocacy has become effective. One thing is clear: myopia has not been banished, and no unequivocal answer can be given to the question whether myopia has become less frequent. Many factors have to be considered in any comparison in the frequency of the myopia fifty years ago and to-day. The data are not always strictly comparable, and the great social changes that have occurred in the interval have brought with them a readjustment in the strata of society and changes in the environment of children that are not to be lightly dismissed in any such consideration. Even so, available data are scanty and their interpretation open to dispute.

Seggel, reporting on the changes that have occurred at Munich, holds that the incidence of myopia has decreased by 10 per cent. in the case of boys and by 30 per cent. in the case of girls during twenty years. Ask, likewise, reports a decrease in Sweden: in 1906 he found the incidence of myopia in schoolboys to be 25 per cent., whereas in 1883 A. Key had found it to be about 40 to 50 per cent. Ask's conclusions were questioned by Heinonen, who could find no difference in incidence in 10,000 cases examined in Finland between 1910 and 1927; on the basis of a more detailed examination of Ask's figures he doubts their validity. Holm, reporting on Denmark, agrees with Heinonen: comparing data collected by Tscherning in 1881 with the data for 1924, he could not find any difference in the incidence of myopia. A decrease in the incidence of myopia in Portugal is ascribed by Moutinho and Mattos to general hygienic improvement. It should be noted that the problem of school hygiene and elimination of excessive close work in its bearing on the causation of myopia is quite distinct from that of myope classes for progressive myopia. Myope schools, as Harman, who is largely responsible for them, points out, are not based on any particular theory of myopia, but are intended for the child handicapped by defective vision. The evidence brought forward by Harman and others as to their beneficial influence on the course of progressive myopia is concerned with a distinctly different problem—the influence of too much close work on existing myopia.

THE GROWING EYE

The eye of the newborn infant is generally said to have an axial length of 16 millimetres; by the age of 8 the eye is held to have grown to its adult dimensions (Weiss). These are anatomical observations not based on any large series. The validity of these figures apart, it is a common experience that the eye grows during childhood. If one assumes that the anterior segment of the eye undergoes no change in its refractive power during this process, it is clear that the elongation of the eye by 8 millimetres must be accompanied by vast changes in its refraction—somewhere between 30 and 40 or more dioptries. This is hardly the case. While no unquestioned mean of refraction has been established for newborn infants, the available evidence all goes to show that the

* Read in opening a discussion in the Section of Ophthalmology at the Annual Meeting of the British Medical Association, Dublin, 1933.