THE REMOTE RESULTS OF PUERPERAL SEPSIS*

BY

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We have been invited by the officers of our Section to present and to discuss the relatively undefined problem of the remote results of puerperal sepsis. Investigations have been so largely concerned the world over with the tragical question of maternal mortality and the computation of its prevalence that the systematic "follow-up" of non-fatal cases of puerperal infection—and they are, of course, the majority—into the immensity of the area of puerperal morbidity has been comparatively neglected. The difficulties in arriving at concise data are great enough as regards maternal mortality, but they are greater still in relation to morbidity.

There are signs of a widespread desire that this neglect should be repaired, and it would seem to be opportune to enter a plea for, so far as may be, an international scheme of investigation, and for representations to that effect to be made to the Health Organization of the League of Nations. Such help as may be gained by deductions made from international figures arrived at on the basis of a common form of inquiry would thus be more readily available, and the unhappy experience of those who for years have been searching for reliable information as to comparative national rates of maternal mortality would be avoided. The action which the League has taken towards standardizing the make-up of the mortality rates has been widely acclaimed, and has already had good results.

So far as the records relating to health insurance are concerned, it would be some consolation to panel practitioners if they could be assured that their scriptorial duties for approved societies and health departments were used for some scientific and social ends. For our present purposes I have explored the possibility of returns concerning maternity benefit and sickness benefit of insured women showing the incidence and later results of puerperal infection. Dr. McKinlay of the Department of Health for Scotland most courteously furnished me with some interesting figures dealing, as closely as might be, with the subject. But after analysis the deductions which could then be made in the direction of our main purpose were practically valueless. I tested the returns of some of the larger approved societies with a similar result. I was assured, however, that it would be possible so to amend those relating to maternity benefit and any subsequent illnesses as to furnish a useful follow-up. This is a consideration which it may be well to keep in mind.

The significance of the term "remote" in the title of our discussion is, presumably, to be taken, not in the anatomical sense—though this cannot be excluded—but as indicating that the results of puerperal sepsis to be discussed are those which may be found a period of time well after that which is commonly regarded as constituting the puerperium.

Trauma in the Problem of Puerperal Morbidity

Concerning the scope of the discussion, we cannot, I think, rule out the consideration of sepsis which is auto-genous in origin, and still less can we, if our consideration of the subject is to be of service, rule out the question of trauma, which in so many cases must have provided the

avenue for infection. The latter must be our central theme to the extent of excluding from our discussion the class of case in which the trauma, *quâ* trauma, is the cause of the dominant signs and symptoms that accompany the morbidity. Strictly speaking, and apart from the separation of the secundines, there is no labour which is wholly free from some degree of trauma in the birth canal—in *all* cases at the cervix level and in all primiparae also at the ostium vaginae. It is a significant reflection, too, that in this sense there is in every case a gateway, small though it may be, for unresisted infection.

If we could really understand why it is that in the majority of cases infection does *not* occur—in other words, if we knew more fully what are the factors and conditions which constitute resistance to infection—we should be in an infinitely happier position, and we should probably have little use for subterfuge in the "irreducible minimum." If we understood one normal, and therefore uninfected, case through and through, then, like Tennyson's "flower in the crannied wall," it would bring to us a whole world of meaning.

Combined Traumatic and Infective Lesions in Maternal Morbidity

If it be true, and I believe it is true, that it is not possible to express in other than speculative figures the general prevalence of late puerperal morbidity, our task is the more difficult if we try to isolate from the component factors of the whole problem of morbidity the prevalence of that one which, by common consent, is much the largest—namely, sepsis. Its position in mortality rates is notorious. The Health Organization of the League of Nations gives it in world rates as responsible for 50 to 75 per cent. of maternal deaths. We may be well assured it holds a highly responsible status also in respect of puerperal morbidity.

Combined traumatic and infective lesions accounted for 48 per cent. of all the gynaecological operations in a given year at the Royal Samaritan Hospital, Glasgow, and 47.3 per cent. was the corresponding figure, over a period of six years, at the Royal Infirmary, Liverpool. Blair-Bell, in the Ingleby Lectures, 1931, expressed the view that in England and Wales trauma and infection accounted for 75 per cent. of all maternal disablement, and that from all causes 60,000 (10 per cent.) parous women were crippled annually, many gravely; others, though less seriously injured, were yet sufficiently so to cause ill-health and disablement. James Young more conservatively estimates the annual disablement toll as 40,000. In the absence of any generally adopted scheme for the record and follow-up of cases there must always be widely varying estimates of their numbers and nature.

An Investigation in the Literature

Munro Kerr, in *Maternal Mortality and Morbidity* (1933), commenting on the inadequacy of the information to be obtained from mere pyrexial records covering shorter or longer periods of post-partum time, makes a plea for the fuller and more significant facts to be derived from an extensive investigation of the histories of mothers who have completed their child-bearing, together with an investigation of deaths due to child-bearing but occurring at long intervals thereafter.

Many women, as a result of infection, cease to bear children long before the advent of the climacteric, and the retrospect of the reproductive life of a number of mothers, a sufficiently large number to warrant average deductions, must be profoundly impressive in regard to the scope of the resultant familial and communal disabilities.

Munro Kerr includes in his book an able and reliable contribution by Dr. Donald McIntyre, which embodies an

* Read in opening a discussion in the Section of Obstetrics and Gynaecology at the Annual Meeting of the British Medical Association, Melbourne, 1935.

Table showing Importance of Infective Lesions of the Reproductive Tract resulting from Child-bearing in 2,700 cases in Dr. Donald McIntyre's wards in Royal Samaritan Hospital, Glasgow (1928-32).

Lesions or Groups	Total Cases	Average Age	Parous	Average Parity		Instrumental Deliveries		Interval since last pregnancy, in years.
				Children	Abortions	Patients	Total	
1. Chronic endocervicitis with or without cervical erosion, and with or without corporeal endometritis	152	30.5	109	2.55		41	60	—
2. Chronic corporeal endometritis	103	32.0	74	4.2		25	—	—
3. Chronic subinvolution and chronic metritis	146	39.5	146	4.2	0.64	70	115*	7.7
4. Inflammatory hypertrophy of cervix	57	37.2	57	4.2	0.55	38	60	5.6
5. Inflammatory lesions of tubes and ovaries	59	34.0	59	2.3	0.63	24	27	5.6
6. Pelvic peritonitis and cellulitis	16	30.6	15	2.3	0.5	5	8	6.6

* Two had Caesarean section performed.

investigation of disablement resulting from infection and trauma in childbirth, and gives a table (here reproduced) showing the importance of infective lesions on the reproductive tract resulting from child-bearing in 2,700 cases in Dr. McIntyre's wards in the Royal Samaritan Hospital, Glasgow (1928-32). With regard to the analysis of chronic infective lesions, McIntyre refers to the well-known difficulty in connexion with the identification of the type of the infecting organism, especially in the lower part of the genital tract, and as regards the upper levels of the tract he alludes to the fact that in the majority of instances pus or inflammatory exudate, if present, is sterile.

CHRONIC ENDOCERVICITIS

Commenting on the cases in the various groups of the table Dr. McIntyre says concerning Group I that eleven cases were probably instances of puerperal infective lesions located in the pelvis, leaving chronic conditions of a disabling nature. This group of conditions of the cervix, the sequelae as they so often are of puerperal sepsis with or without trauma, is regarded, with good cause, as predisposing to carcinoma, and is therefore of cardinal importance.

This causal relation is discussed in an interesting and able fashion by Professor G. I. Strachan in a paper on "Some Aspects of Cervical Pathology," contributed to the *British Journal of Obstetrics and Gynaecology* (1933, xl, No. 3). He refers to the inevitability of some degree of trauma in labour, and says that chronic inflammatory and irritative after-effects may be as marked after slight as after marked laceration of the cervix; and that these after-effects and the symptoms produced by them and their late sequelae depend much more on the degree of infection contracted in the puerperium than on the physical extent of the laceration.

The majority of cervical lacerations, being of minor dimensions, are with difficulty recognizable, if at all, under the conditions prevailing at or shortly after labour, and are therefore not amenable to the sutural treatment which is so clearly indicated for the injuries of greater extent. Given infection, therefore, the possibilities of the development of the results—it may be at a remote period—of chronic irritation of the cervical tissues represent a wide field.

The quality of persistence, almost unequalled in other organs of the body, that characterizes infection of the cervix is well calculated to reinforce the other influences present which favour disorder and degeneration of its tissues. In this connexion Strachan quotes the commonly accepted view that the term "erosion" is unwarranted, that the condition is not a chronic ulcer, but that it represents an extrusion of columnar gland-bearing epithelium on to the vaginal portion of the cervix. He claims, however, that, microscopically, inflammatory changes, as evidenced by round-celled infiltration, especially under the

surface and around the glands, are well seen, and that the impression is conveyed of a chronic infection constantly repeated. He explains that in a large proportion of such cases there is no junction between the columnar and the squamous epithelium; that microscopically a raw and often small area of granulation tissue devoid of any epithelial covering usually persists between the two epithelia; and that it is in such cases that the signs of chronic infection continue. Such a condition may persist for years.

Cervical infection is favourably affected by the menopause, and the physiological post-menopausal atrophy of the cervix may be strikingly illustrated by the reduction of a hypertrophied, chronically infected cervix to the dimensions of a small nodule in the vaginal vault, owing to the disappearance of the fibro-muscular tissue, mainly, it is thought, from diminished blood supply. The epithelial elements, however, may persist in good condition in the cervix long after the menopause, thus affording a contrast to the post-menopausal changes in the body of the uterus, where the atrophy of the epithelium and the persistence of the fibro-muscular walls are the normal events.

With regard to the age incidence of carcinoma of the cervix, Strachan finds that in 300 cases 54 per cent. occurred in the post-menopausal period, while 49 per cent. occurred at or over 50 years of age; he quotes percentage figures given by Wilson, Roger Williams, and Weibel as pointing to the same conclusions.

The view is supported that, the irritation of the chronic infection of the cervix notwithstanding, the fibro-muscular tissue with its good blood supply usually prevents the development of carcinoma in the epithelial elements, but that after the menopause, the resistance of the fibro-muscular tissue being lowered, the well-formed epithelial elements are more liable to take on unrestricted growth and penetrative powers, with the production of carcinoma in either the squamous or the columnar epithelium.

CHRONIC CORPOREAL ENDOMETRITIS

In 11.6 per cent. of Dr. McIntyre's 103 cases in which the diagnosis of chronic corporeal endometritis was established histologically, a history was obtained which would justify the assumption that the condition originated in puerperal infection. The history also revealed that, as compared with the chronic endocervicitis group in which the fertility rate was definitely depreciated, the average parity in corporeal endometritis (diagnosed histologically) was equal to the communal rate.

CHRONIC SUBINVOLUTION AND CHRONIC METRITIS

Commenting on this group of conditions Dr. McIntyre says that a definite origin in puerperal infection is not easily established, in view of the causal infection being so frequently one of low virulence. In 10 per cent., however, a puerperal infection origin is traceable, but

in nearly 50 per cent. there was a history of artificial aid to delivery.

INFLAMMATORY HYPERTROPHY OF CERVIX

Cases were not included in this group in which injury to the cervix was recognizable, as the trauma in that event was regarded as primary and the infection as secondarily imposed. Under these conditions, therefore, only four of the fifty-seven cases in this group would qualify strictly as primarily due to sepsis. The majority would represent the common history of trauma of the cervix during delivery, followed by a greater or less degree of ectropion involving eversion of the canal with exposure of its columnar epithelium, infection, and possibly repeated reinfection.

INFLAMMATORY LESIONS OF TUBES AND OVARIES

In the fifty-nine cases under this heading there was a clear or a presumptive history of puerperal fever in twenty-one. In thirty-seven no pus was found at operation, and of the remaining operation cases in which pus was found in *five only* were the organisms identified.

As is well known, pus, where present in these cases, is frequently sterile. Its fluid content may become absorbed and leave an inspissated material, which in due course may disappear together with the surrounding inflammatory exudate. The prolonged later phases are afebrile, and are often accompanied by poor general health and few, if any, local signs and symptoms. The passive treatment and observation implied require patience on the part of doctor and patient, but the result is well worth waiting and catering for. It is the basis of the "ambulatory treatment" of which Arthur Curtis has written so convincingly.

In the retrospect of our cases coming into the category we are now considering most of us, I think, are gratified to note that the proportion of instances in which we do *not* perform laparotomy is increasing. In Dr. McIntyre's table, out of the fifty-nine cases in this group laparotomy was not performed in ten.

Tuberculous infection was, as far as possible, excluded, and, with this exclusion, the parity rate was low. In comparison with viable births the abortion rate was high, and was associated with a high incidence of septic infection.

In dealing with the point that cases of gonococcal infection may have been included, Dr. McIntyre admits the difficulty of disproving the suggestion, but claims that in the experience of himself and his colleagues it is a comparatively rare infection in the upper levels of the genital tract, and that of the five cases in which organisms were isolated from the pus present, in not one was the gonococcus found.

PELVIC CELLULITIS AND PELVIC PERITONITIS

In five cases of the sixteen in this group there was a probability of puerperal infection being the causal agent. In this, as in the preceding group, the parity rate was low and the average age of the patient young. For anatomical reasons* the association between the two groups must be close.

URINARY INFECTION

Under this heading reference is made to three cases in which bladder infection was certainly the important, and probably the only, puerperal complication present. It is added that these cases are noted to indicate the fact that the category of disabilities which may result from child-bearing must include urinary tract infection, and, further, to illustrate the difficulty in tracing infective lesions in the pelvis to the puerperal state from *histories*, the facts of which are dependent on the memory and intelligence of the patients.

To this valuable contribution on disablement resulting from infection in childbirth a summarizing note is appended indicating that chronic infective lesions, when restricted to the lower level of the genital tract, produce discharge, discomfort, mild invalidism, and possibly sterility; that treatment is possible without serious tissue destruction; that at the higher levels of the reproductive tract invalidism is pronounced, and destruction of tissue may lead to arrest, premature termination of reproductive life, or total loss of the essential reproductive organs; and that there is but one bright aspect of this matter—namely, when operative treatment is carried out the mortality is very low.

The capacity of resistance to reinfection, it is reasonable to assume, is one of the factors involved in the absence of mortality following the operations indicated in the table we have been considering. This, or certainly a very low mortality rate, is a common experience among us as operators, and tends to support the view held by some that non-fatal puerperal infection may confer a measure of immunity against subsequent similar infections.

Thrombophlebitis

Thrombophlebitis following puerperal infection must certainly be added to the list of conditions in our category. The risk of embolism in point of time may not, in fact, be remote, but the dread of it, by both practitioner and patient, may be unduly prolonged. I recall an illustrative case. The patient was a nurse, who therefore knew much and yet too little about embolism. She had been bed-ridden for many months, and long after every vestige of swelling had disappeared was still terrified of the possibility of embolism being induced by any considerable movement or by getting up. She was persuaded to put away her fears, and speedily resumed a normal existence.

Apart from embolism, phlegmasia of one or both limbs may result in prolonged disablement. In hospital clinics the follow-up treatment is usually continued in the physiotherapeutic department.

It will be understood that, with certain allowances, the conditions dealt with in the foregoing may equally well be sequent to abortion or premature labour as to labour at term.

I have not made special reference to possible effects of puerperal infection on other pelvic conditions such as uterine fibroids, ovarian tumours, and the like, as these effects are usually too immediate for our title; and the same observation will probably apply to the protean developments of pyaemia and to puerperal insanity with the psychoses in so far as they may be related to infection.

By its very size detailed *Treatment* is excluded from this paper and *Prevention* is summed up in the New Dispensation of ante-natal, intra-natal, and post-natal care.

C. J. Roos (*Nederl. Tijdschr. v. Geneesk.*, July 13th, 1935) records an outbreak of thirty-three cases of an acute exanthem which occurred at Rotterdam at the end of 1934. With the exception of a man aged 20, all the patients were children aged from 2 to 13 living in two adjacent streets, and a large number of them were attending the same school. The rash, which appeared with only a slight prodromal headache and feverishness, showed the typical appearances of erythema infectiosum. On the other hand, the peripheral lymphatic glands, including the cervical chain, which are not usually affected in erythema infectiosum, were enlarged as in rubella, and examination of the blood showed the picture characteristic of that disease—namely, relative lymphocytosis and a plasmocytosis, the proportion of plasma cells varying from a minimum of 1 to a maximum of 11.5 per cent.