3,144 CONSECUTIVE DELIVERIES WITHOUT A MATERNAL DEATH DUE TO PREGNANCY

BY

RUFUS C. THOMAS, F.R.C.S.Ed., M.R.C.O.G.

*Assistant Medical Officer of Health for Obstetrics and
Obstetric Consultant, County Borough of Croydon;
Obstetrician in Charge, Croydon Obstetric Service*

The Croydon Obstetric Service has, between January 3, 1938, and June 4, 1939, conducted 3,144 consecutive deliveries after the twenty-eighth week, among which a maternal death attributable to pregnancy has not occurred. (One mother died of pneumococcal pneumonia and empyema, the cause of death being confirmed by post-mortem examination. She had been ill for seven days before she was delivered, on the last day of her illness, of a thirty-eight-weeks live baby, after a labour of about six hours. This was the only death among the deliveries covered by the series, and cannot be considered attributable to pregnancy.)

The series is comprised of 2,015 cases delivered in the two hospitals of the Croydon County Borough—namely, Mayday Hospital and St. Mary's Maternity Hospital—and 1,129 cases delivered by the Municipal Domiciliary Service. Of the hospital deliveries 1,194 booked cases and 129 emergency cases were delivered in the Mayday Hospital maternity department, and 692 booked cases in St. Mary's Maternity Hospital. The 1,129 municipal domiciliary cases were also booked, the total booked deliveries therefore numbering 3,015. All the patients booked for hospital and almost all the domiciliary patients received their ante-natal supervision at the borough ante-natal clinics, a short description of which is given below. Many of the booked and emergency cases had been sent to the clinics or to hospital by their own medical practitioners on account of abnormalities arising during pregnancy or labour, and a certain proportion of these had been seen by me in my capacity of obstetric consultant to the borough, either at the clinics or at their own homes, in consultation with the practitioners concerned. Of the 1,129 domiciliary patients, ninety-two had booked the services of their own practitioners, the borough midwives attending in the capacity of "maternity nurses." This number is included in the series, as the borough midwives were in attendance. Of the remainder, a number had been supervised by independent midwives, and others had had no supervision at all. It will be seen, therefore, that the cases which comprise the series are drawn from all possible sources, and have the greater interest on that account.

Description of the Service

The Croydon Obstetric Service provides complete ante-natal, natal, and post-natal supervision under the clinical direction of the same whole-time specialist, the ante-natal clinics, Mayday Hospital (forty-eight maternity and twenty-nine gynaecological beds), St. Mary's Maternity Hospital (thirty-two beds), the domiciliary midwifery service (superintendent and eleven midwives), and the post-natal clinics constituting the links in the chain. The services of the borough obstetrician are at the disposal of all the medical practitioners in the area. Independent midwives may send their patients for single consultations or for complete ante-natal supervision as desired. As indicated above, the borough midwives attend as maternity nurses those patients who have booked the services of their own doctors. Practically all the obstetric emergencies which occur in the borough are admitted to the maternity department of Mayday Hospital. The greatest care is taken to

ensure the fullest co-operation, both within the Service itself and between the Service and the medical practitioners and independent midwives in the borough. The Service has the advantage of the advice of the Council's consultants, of which it makes free use, particularly that of the radiologist, pathologist, physician, tuberculosis physician, orthopaedic surgeon, and the dental surgeons.

Ante-natal Supervision

Six ante-natal clinics are held each week for patients booked for hospital delivery, the conduct of which is shared equally by three lady assistant medical officers of health. All new patients see first the lady almoner, who makes full inquiry into their home conditions and financial position. They then undergo an exhaustive examination by the medical officer, which includes all aspects of their general health as well as their obstetric condition. On the results of this examination, and bearing in mind the information supplied by the almoner as to their home conditions, the decision is made as to which patients should be allotted beds in hospital and which are suitable for delivery at home by the domiciliary branch of the Service. In allocating beds preference is given to abnormalities, primiparae, and those whose home conditions are unsuitable. The previous obstetric history is given full consideration, and women who have had difficult labours, placenta praevia, accidental haemorrhage, toxæmia, etc., are automatically booked for hospital delivery. Cases thought to be normal, and whose home conditions are satisfactory, are referred to the superintendent municipal midwife, who makes the necessary arrangements for home delivery and for ante-natal care at the municipal midwives' clinic. The reference of normal cases to the domiciliary midwifery service has considerably relieved the strain on the in-patient accommodation, and provides the domiciliary service with a large proportion of its patients. In all cases of doubt as to the suitability for home delivery the case is referred to the obstetrician.

Three ante-natal clinics a week are held for patients booked for home delivery; these are conducted by the assistant medical officer who resides at St. Mary's Maternity Hospital. If during the course of this supervision any abnormality is discovered which makes it inadvisable for the patient to be delivered at home she is referred to the obstetrician, who makes the necessary arrangements for transfer to the hospital list. There is thus a treble check on the patients of the domiciliary service, by which it is hoped that all abnormalities are recognized and ensured proper treatment.

Routine Attendances at the Clinics

Patients attend monthly up to the twenty-eighth week, fortnightly up to the thirty-sixth week, and weekly from then until delivery. Urine is tested and blood pressure recorded at each visit by health visitors specially trained in ante-natal work. All cases are seen by the medical officer at the thirty-second, thirty-sixth, and thirty-ninth weeks, an abdominal examination being made on each occasion. The examination at the thirty-second week is specially directed to the discovery and correction of breech presentation. If external version fails the patient is referred to me. If I also am unsuccessful in the clinic the patient is admitted to hospital, placed in the Trendelenburg position for a period of one to two hours, and external version again attempted. This simple manoeuvre has been found very successful in many cases, in that it displaces the breech out of the pelvis by gravity, rendering the subsequent version easier. Quite a number of spontaneous versions have been found to occur while the patient has been in the Trendelenburg position. It is thought that the reversal of the foetal poles in relation to gravity combined with the displacement of the foetus would account for this. In only a few instances has version under an anaesthetic been performed. By the above methods about 75 per cent. of all breech presentations are corrected.

The examinations at the thirty-sixth and thirty-ninth weeks reveal non-engagement of the head suggestive of placenta praevia, disproportion, abnormal attitudes of the foetus, and so on. All cases showing any form of abnormality, whatever the cause, are referred to the obstetrician. It has been my

practice to continue the supervision of such patients personally until delivery, generally making an examination every week. During the period covered by the series now reported I carried out 1,885 such examinations. In this way I maintain contact with practically every abnormal booked case in the Service.

In regard to pelvimetry, in addition to the usual external measurements the transverse diameter of the outlet is taken as a routine in all primiparae and in multiparae whose obstetric histories show any evidence of delay in the second stage. The method used is that of the clenched fist, the four inner knuckles being pressed between the ischial tuberosities. The measurement is entered as 4K, 4K+, 4K++, each + meaning 1/4 inch. For correct mensuration it is essential for the examiner to know the exact width of his (or her) own knuckles, which should be measured with the callipers.

All cases of outlet contraction are referred to me about the thirty-fourth week. I check the outlet, palpate the pubic arch, and by rectal examination the coccyx, ischial spines, and lower sacral curve. If I am not satisfied the patient is admitted for a pelvic examination under anaesthesia. Moderate degrees of contraction in which dystocia is anticipated if allowed to go to term are treated by surgical induction at the time when the foetus is thought to have the best chance of survival. In cases where the outlet is so contracted that a foetus of 5 lb. is not likely to pass with safety, Caesarean section at term is performed.

In regard to the toxæmias, all patients with raised blood pressure, with or without albuminuria, are admitted to hospital for investigation and treatment. Urea-clearance tests and blood-urea estimations are done in all cases which do not react to treatment in a reasonable time or whose condition gets worse in spite of treatment. Patients who become normal are discharged to await labour. Those who do not are retained in hospital until such time as intervention appears necessary. By continued observation and timely intervention it is hoped to avoid the dangers of eclampsia, accidental haemorrhage, and permanent renal damage.

Placenta Praevia.—All booked patients are warned, by a notice on their appointment cards, that if bleeding occurs they should lie down at once, and either send for a doctor or come into hospital. Persistent malpresentation or non-engagement of the head, in the absence of other definite cause, is looked upon as very suspicious of placenta praevia, and such cases are admitted to hospital for examination under anaesthesia. In this way many cases of placenta praevia have been diagnosed before there has been any warning haemorrhage at all. Caesarean section is done for the central type, and the others are treated by rupture of the membranes and the application of vulsellum forceps to the scalp. Vulsellum forceps are used in preference to Willett's forceps to avoid the sloughing of the scalp which so often occurs after using the latter instrument. After the vulsellum forceps are in position the handles are surrounded with sterile gauze soaked in 1 per cent. acriflavine, and a nurse sits by the labour bed with instructions to watch for any bleeding, which she can see at once by lifting the upper edge of the gauze, and which she can control by gentle traction on the handles. No more traction is applied than is sufficient to control the bleeding, and none is applied in the absence of bleeding. The danger of pulling the forceps off the scalp, and the amount of damage to the scalp, are thus reduced to the minimum. Similarly, the amount of pressure on the placenta is much reduced, with a corresponding increase in the chances of survival of the foetus. In only one case in this series has an internal version been done for placenta praevia, that being a shoulder presentation.

In Table I are shown some of the major abnormalities treated, together with Caesarean sections and forceps deliveries, in the two hospitals. It must be remembered that Mayday Hospital takes all the emergencies and by far the greater proportion of abnormal booked cases. The lower segment operation was done in forty-nine out of the seventy-four cases of Caesarean section. Spinal anaesthesia was employed in fifty-nine out of the seventy-four Caesarean sections. The solution used was heavy percaïne, specific gravity 1024 (Ciba, Ltd.), the routine

TABLE I.—*Some Major Abnormalities Treated, together with Caesarean Sections and Forceps Deliveries*

	Mayday Hospital		St. Mary's Hospital	Total
	Booked	Emergency		
Placenta praevia	23	11	7	41
Accidental haemorrhage ..	13	9	1	23
Hydramnios	21	1	4	26
Eclampsia	0	4	0	4
Toxaemia, including all cases of albuminuria and/or hypertension	247	26	116	389
Shoulder presentation.. ..	4	4	2	10
Prolapsed cord.. .. .	4	1	4	9
Forceps deliveries	51	8	35	94
Caesarean section	51	11	12	74

quantity injected being 2.5 c.cm. Ephedrine 1/2 grain was given as a routine before starting the operation. The anaesthesia obtained was perfect in every instance, and was found particularly suitable for the lower segment operation, relaxation of the abdominal muscles being so complete that full exposure of the site of the uterine incision is easily secured by means of a Doyen retractor, both the opening and the subsequent closure of the uterus thus being greatly facilitated. In no instance was there any anxiety referable to the anaesthetic.

Medical Aid in Domiciliary Cases.—The practice followed by the municipal midwives where medical aid is required for abnormalities arising during labour is the usual one of calling in the patient's own medical practitioner, the form prescribed by the Central Midwives Board being filled in. The figures for forceps deliveries and other procedures carried out by practitioners among the 1,129 domiciliary patients are: forceps, 25; extended breech, 2; simple breech, 1; transverse, 1; manual removal, 3. There were no stillbirths or infant deaths among these deliveries.

Live Births, Stillbirths, and Infant Deaths

Among the 3,144 deliveries there were thirty-two sets of twins and one set of triplets. The total number of infants born was therefore 3,178. The distribution of multiple births was as follows. Twins: Mayday Hospital, 17; St. Mary's Hospital, 11; domiciliary, 4. Triplets: Mayday Hospital, 1. The number of stillbirths which occurred among the 3,178 infants was ninety-two, including all premature, abnormal, and macerated foetuses: Mayday Hospital, 60; St. Mary's Hospital, 18; domiciliary, 14. The stillbirth rate for the Service is therefore 28.9 per 1,000 total births.

The numbers of maternal and foetal abnormalities and macerated foetuses associated with the ninety-two stillbirths are given in Table II.

In many instances more than one of the conditions were present in the same case. For instance, three hydrocephalic foetuses were macerated, as also was the foetus of the case of blackwater fever. (This case was reported in *Trans. roy. Soc. Trop. Med. Hyg.*, 1939, **32**, 743.) Other diseases associated with foetal maceration were toxæmia (six) and accidental haemorrhage (two). Shoulder presentations and prolapsed cords were associated in three cases, one of which had placenta praevia. Foetal abnormalities were present in seven out of the eight cases of hydramnios, anencephaly (two), anencephaly

TABLE II.—*Maternal and Foetal Abnormalities and Macerated Foetuses among Ninety-two Stillbirths*

	Mayday Hospital	St. Mary's Hospital	Domi- ciliary Service	Total
Macerated	16	6	6	28
Anencephalic	4	2	1	7
Hydrocephalic	4	3	3	10
Achondroplastic	1	1	—	2
Spina bifida	1	2	—	3
Placenta praevia	6	—	—	6
Accidental haemorrhage	4	—	—	4
Toxaemia	10	1	—	11
Eclampsia	3	—	—	3
Hydramnios	5	3	—	8
Shoulder presentation	6	1	—	7
Prolapsed cord	3	2	—	5
Blackwater fever	1	—	—	1
Twin pregnancy	3	1	—	4

TABLE III.—*Individual Weights and Maternal and/or Foetal Abnormalities*

Case No.	Weight of Child	Maternal and/or Foetal Abnormality
	lb. oz.	
1	2 13	Acute hydramnios. Anencephaly
2	4 10	Acute hydramnios
3	2 15	Acute hydramnios. Anencephaly
4	3 5	Hydramnios. Hydrocephaly
5	2 11	Hydramnios. Anencephaly
6	3 15	Hydramnios. Spina bifida. Prolapsed cord
7	5 3	Placenta praevia. A.P.H.
8	3 7	" " "
9	3 13	" " "
10	3 8	Placenta praevia. Shoulder presentation with prolapsed cord
11	5 4	Accidental A.P.H. Pre-eclampsia
12	4 9	" " "
13	3 9	Pre-eclampsia. Hydrocephaly. Macerated
14	5 2	Eclampsia
15	2 4	"
16	4 12	Toxaemia. Macerated
17	3 4	Toxaemia. Placental infarction
18	2 14	Toxaemia. Macerated
19	4 15	Toxaemia
20	2 14	Toxaemia. Macerated
21	5 2½	Toxaemia
22	5 1	Blackwater fever. Macerated
23	2 12	Chronic nephritis. 7 previous stillbirths
24	3 8	Cardiac disease. First twin
25	5 6	Second twin
26	3 9	Breech. No cause ascertained

and spina bifida (two), spina bifida (one), hydrocephaly (one), and achondroplasia and spinal deformity (one). Embryotomy (perforation) was performed in five cases: one was a Mayday Hospital booked case with a large hydrocephalus; one a St. Mary's Hospital booked case, brow presentation with a spinal deformity (seen in the

x-ray film. This was the achondroplastic foetus); two emergency cases at Mayday Hospital, both "failed forceps before admission," one of which had a four-inch rectal tear and the other a three-inch tear in the vaginal vault on admission; and one an emergency eclampsia at Mayday Hospital, the foetus being dead on admission. Three stillbirths occurred in forceps deliveries, the indications for which were primary uterine inertia, occipito-posterior position, and contracted pelvis. Apart from the breech deliveries following internal version for shoulder presentation, five stillbirths occurred in breech labours, three of which had extended legs (one of these had a prolapsed cord), one was a contracted pelvis, and one was premature.

TABLE IV.—*Birth Weights and Associated Conditions among Thirty-eight Neo-natal Deaths*

Case No.	Birth Weight	Associated Maternal and/or Foetal Condition
Mayday Hospital :		
	lb. oz.	
1	3 8	Placenta praevia
2	4 0	" "
3	5 14	Placenta praevia. Atelectasis
4	6 0	" " "
5	2 0	Accidental haemorrhage
6	2 10	" "
7	3 6	" "
8	2 8	Pre-eclampsia
9	2 8	Pre-eclampsia. Triplet
10	4 7	Pre-eclampsia
11	2 5	Eclampsia
12	1 15	Hydramnios
13	4 7	Exomphalos
14	4 4	Severe anaemia of pregnancy
15	5 0	Congenital heart disease
16	2 8	Cause of premature labour not known
17	2 13	" " " " "
18	3 12	Atelectasis. Cause of labour not known
19	4 10	Cause of premature labour not known
20	5 8	Cerebral haemorrhage. Spontaneous delivery
21	8 2	Cerebral haemorrhage. "Failed forceps" B.A.
22	3 9	Cause of premature labour not known
23	2 14	" " " " "
24	6 2	Toxaemia. Melaena and haematemesis
25	7 2	Acute gastro-enteritis
26	7 6	Cord infection. Liver abscesses
27	7 14	Atelectasis
St. Mary's Hospital :		
28	Not stated	Placenta praevia
29	3 3	" "
30	2 13	Premature rupture of membranes
31	2 14	" " " "
32	4 0	Second twin
33	5 3	Second twin. Cardiac
34	5 8	Haemorrhage of newborn
35	5 10	Bronchopneumonia
36	6 15	Atelectasis
37	7 8½	Congenital heart disease
38	8 6	Cerebral haemorrhage. Forceps delivery

One emergency case was admitted to Mayday Hospital with the baby's head already delivered by forceps but with the shoulders impacted. The baby was dead on admission.

Among the seventy-eight stillbirths which occurred in the two hospitals there were twenty-six premature fetuses, taking the weight of 5 lb. 8 oz. or less as the standard of prematurity. In every case except one abnormalities, foetal or maternal, or both, were found. The table of individual weights and maternal and/or foetal abnormalities (Table III) makes interesting reading.

The infant deaths which occurred among the 3,086 live births numbered forty-three: Mayday Hospital, twenty-seven; St. Mary's Hospital, eleven; domiciliary, five. The infant death rate for the Service is therefore 13.9 per 1,000 live births.

Among the thirty-eight neo-natal deaths which occurred in the two hospitals there were twenty-six premature infants. As in the case of the stillbirths, maternal and/or foetal abnormalities were present in many instances. The birth weights and associated conditions are set out in Table IV.

Summary and Comments

A series is recorded of 3,144 consecutive deliveries without a maternal death due to pregnancy. The stillbirth rate for the series is 28.9 per 1,000 total births. The infant death rate for the series is 13.9 per 1,000 live births.

A description of the Croydon County Borough Obstetric Service is given, with reference to personnel, hospital accommodation, clinics, and routine ante-natal supervision.

Tables are given showing the major abnormalities treated, and the maternal and/or foetal abnormalities associated with the stillbirths and infant deaths.

It will be seen from the tables that the lower segment operation has been the operation of choice for Caesarean section (66 per cent.). Reference is also made to the use of spinal anaesthesia in fifty-nine out of the seventy-four Caesarean sections (80 per cent.), and to its particular suitability for the lower segment operation.

The number of booked patients admitted to hospital with toxæmia, including all cases of hypertension and/or albuminuria, was 363—that is, 12 per cent. of the total of 3,015 booked patients. No cases of eclampsia occurred among these patients. In the four emergency cases of eclampsia three babies were stillborn and one died.

Reference has been made to the care taken to ensure the fullest co-operation between the Service and the practitioners, which must be one of the greatest essentials in bringing the maternal mortality figures to the irreducible minimum. It must be agreed that such co-operation has been attained to a very gratifying degree in the period covered by the series reported, the successful outcome of which is due in no small measure to the foresight of the practitioners who sent their cases to us in time to institute proper treatment. This is true, not only of the greater proportion of emergencies but also of many of the booked patients, who were sent to the clinics on account of abnormalities which their doctors thought should be treated in hospital, and whose supervision we gladly undertook.

In view of the great interest which the scientific world has shown in the plight of the refugees from Germany and Central Europe, so many of whom are the wives or children of scientific workers, attention may be drawn to a pamphlet published by the Welfare Department of the Central Office for Refugees, Bloomsbury House, Bloomsbury Street, London, W.C.1. The pamphlet is entitled "Entertaining our Refugee Guests," and reveals a great need for personal help for many of the victims of persecution.

ON SOME SEASONAL CHANGES IN THE PITUITARY GLAND OF THE EEL

BY

H. MUIR EVANS, M.D., F.R.C.S.

Fellow of University College, London

In January, 1937, the Zoological Society of London published in its *Proceedings* a note on some seasonal changes in the pituitary gland of the eel (*Anguilla vulgaris*); these observations were put on record because they appeared to be of some biological significance in relation to the sexual changes that take place in the period just previous to the migration of the eel. This communication records the results of monthly observations of the pituitary body of the eel over a period of three years, and includes the findings of three series of specimens taken from fish caught between May and October: during the later two months more than one specimen was examined. The conclusions reached from these prolonged observations confirmed the results of the first series—namely, that there was a great increase in size of both anterior and posterior lobes in the last two months before the migration commenced, and that there was a remarkable activity of the cells of the posterior lobe and a pronounced change in the type of cell in the anterior lobe. Through the kindness of the late Professor Woollard, and latterly of Dr. Amoroso, I was allowed to avail myself of the services of his expert technician, Mr. Hancock, and at Lowestoft I was also helped (through the courtesy of the Ministry of Agriculture and Fisheries) in the preparation of material for study by Mr. Clarke, the chief laboratory assistant.

For descriptive purposes I propose to use the terms employed in Sharpey-Schafer's *Histology* (1920), and to speak of the pars anterior, and the pars posterior, which in fish consists of pars intermedia and pars nervosa. In that textbook there is a good illustration of a sagittal section of the base of the brain and pituitary body of the cat. If we omit the pars tuberalis, this section is very similar to a section of the eel's pituitary: the pars intermedia is less vascular than the pars anterior, but more so than the pars nervosa, around which it extends in the cat; this is still more so in the eel, in which the pars nervosa dips down into pockets of a large glandular pars intermedia. This consists of a number of acini the peripheral part of which is composed of four layers, more or less, of cubical cells; and, separated from them by a homogeneous substance, there is a central layer of ependyma cells surrounding the neuroglia of the pars nervosa. In the active state a very different picture is seen. The peripheral cells are almost entirely replaced by a yellow-staining granular secretion. Many empty ovoid cells are present, and frequently the granular secretion is replaced by masses of refractile brown colloid. Surrounding each alveolus is a meshwork of fine capillaries, and within them are small masses of brown colloid together with a few blood corpuscles. The blood vessels supplying this meshwork come from small peripheral arteries which can be traced inwards to form an anastomosis into which the capillaries enter. The blood from the acini is collected by small veins that group themselves into three areas from which a large vessel proceeds. These three vessels unite to form a single trunk opposite the infundibulum, and this passes caudally to enter the lobus infundibuli.

The evidence as to the direction of the circulation in this system is as follows. We have observed in the course of the branching nerve fibres entering the pockets of the pars intermedia small globules of colloid that are homogeneous and refractile, and we have also noted vessels running parallel to them from which these globules have presumably escaped. Pöpa and Fielding (1933) have described similar colloid globules in the hypophysis-portal vessels of the mammalian pituitary, and they state that "the direction in which the blood flows may be gauged by their colloid accompaniment. As colloid (whatever it