food. The temperature should be kept, if possible, below the 103° line by cold sponging, or, if hyperpyrexial, by the wet pack, care being taken to give a stimulant if necessary. Sweats should not be shortened. A continued type of temperature shows a high degree of toxæmia or the presence of probable pulmonary complication. Arthritis should be treated with belladonna or opium applications, and the neuritis by mild hypnotics, such as sulphonal, trional, or paraldehyde; a patient should never be allowed to pass sleepless nights. If the pain is very acute morphine must be given, but should be avoided if possible.

Drugs.—These are of very little use. Quinine, camphor, methyl-blue, collargol, and electrargol have given some satisfactory results lately when administered intravenously. Piazzo's phenololipoid N is recommended—1 c.cm. of a 10 per cent. solution in oil given subcutaneously for an average of eight days was able to cure guinea-pigs which had received lethal doses of *M. melitensis*. It is antitoxic and bactericidal. Burney Yeo's mixture was useful. Digitalis, strychnine, and stimulants, as required by symptoms, must be given.

Serums.—Donzello and Trambusti had a nucleo-protein serum, and lately Nègre and Sergent have prepared a polyvalent serum which has given good results.

Vaccine Treatment.

The great majority of workers, English and foreign, agree that vaccine treatment is the most essential factor in the treatment of undulant fever, and should be continued until the patient is immunized. With this I agree, with the following reservation: that we should not give vaccine when, in very acute conditions, the patient is already over-dosed with autogenous toxins; the ideal is a combination of an antitoxic serum and an autogenous vaccine, as the organism gives rise to so much toxin and remains alive for so long in the tissues. Burnet has shown that, when absent from the blood and urine in infected animals, the *M. melitensis* can always be demonstrated in the marrow of the long bones. Therefore always combine with vaccine treatment the administration of yeast or some other preparation to increase the phagocytic activity of the blood.

THE ANAESTHETIZATION OF PATIENTS FOR THE CLASSICAL CAESAREAN SECTION.*

BY

HERBERT R. SPENCER, M.D., B.S., F.R.C.P.,
OBSTETRIC PHYSICIAN TO UNIVERSITY COLLEGE HOSPITAL.

CAESAREAN section has a special interest for anaesthetists and obstetricians from the fact that the welfare and life of two or more individuals are involved.

On the obstetrical indications for the operation I will say nothing on this occasion except that they are being extended too widely by many practitioners.

On the anaesthetic aspect it requires some courage for an obstetrician to speak before an audience of specialists in anaesthetics, and my courage might have failed me had I not been convinced by an experience of thirty-five years of the value and harmlessness to mother and child of small quantities of chloroform given *à la reine* to mitigate the pains of labour, while insisting on the necessity of anaesthetization by an expert anaesthetist whenever an operation is required.

Perhaps I may claim a little indulgence for having broken a lance in behalf of your specialty at the Centenary of Ovariectomy meeting of the American Gynecological Society at New York in 1909, on which occasion, in a discussion on anaesthesia,¹ I expressed my amazement at finding that American patients were anaesthetized by nurses instead of specially qualified medical practitioners. My criticism was well received by my American colleagues; but Dr. Clarence Webster of Chicago (formerly of Edinburgh) was so affected by my accurate description of the position of anaesthetists in London that he informed the meeting that Scotland was the most important part of the United Kingdom, that in 1896 there was only one paid anaesthetist in Edinburgh, and that patients were generally anaesthetized there by medical students.

In this communication it is to be understood that the anaesthetic is to be administered by specially trained qualified medical practitioners.

Of the two chief methods of anaesthetizing a patient the inhalation methods are generally preferable in cases of Caesarean section. Spinal anaesthesia is undoubtedly more dangerous than inhalation anaesthesia and has drawbacks from which the latter is free. Infiltration anaesthesia has advantages, particularly in patients with pulmonary or cardiac affections. I used it successfully twenty-two years ago² in Caesarean section repeated for the third time. But I have not employed it since.

Spinal anaesthesia and infiltration anaesthesia are less humane than inhalation methods, which induce complete loss of consciousness; and, although they are useful in certain conditions, they are not advisable as a routine method, which it is the object of this short communication to advocate.

Of the two chief inhalation anaesthetics, chloroform and ether, I suppose no anaesthetist will assert that chloroform is as safe as ether, when administered to the surgical degree for long periods, especially to pregnant women. It has therefore largely been given up in favour of ether administered either by the "open" or "closed" method.

Ether Asphyxia of the Infant.

The great disadvantage of ether is that it leads to asphyxia of the infant, which is not the case with chloroform administered to the minimal surgical degree. In my early days of performing Caesarean section I had ether administered—of course by skilled anaesthetists—but found that the child was often asphyxiated, and that hot and cold baths, stimulants, and assistants were required to start respiration in the infant. The occurrence of asphyxia in the child is still common in the practice of many obstetricians. Dr. Hubert Roberts has pointed out its fairly constant occurrence. For many years I have used the method about to be described and can assert that the Caesarean child has never been asphyxiated by the anaesthetic thus administered.

The Method Employed.

No preliminary hypodermic injection is given. The patient, prepared for operation, is placed in the recumbent posture on the operating table in the theatre and the anaesthetic is administered there. Operator and assistants are prepared and the towels adjusted.

Chloroform is then administered by the anaesthetist, who informs the operator when the patient is ready. The operation is then rapidly performed and the child, usually delivered within thirty or forty seconds from the commencement of the incision, always breathes and cries at once.

Ether is then administered for the rest of the operation, usually by the open method.

If there is any unusual loss of blood a hypodermic injection of pituitrin is given.

The result of this method of administration is that in all cases in which the classical Caesarean section is done before or soon after the onset of labour the child is born free from asphyxia and cries at once.

I think it is the ideal method of administration; but I am anxious to have the opinion of members of the Section upon this point: Does the mother run any appreciable risk in having the operation performed while under chloroform administered by an expert anaesthetist? I think she does not, having particularly in mind the tolerance of parturient women for small doses of chloroform.

REFERENCES.

¹ *Trans. Amer. Gyn. Soc.*, 1909, p. 304. ² *Journ. of Obs'c. and Gyn. of the British Empire*, vol. i, 1922, p. 133.

THE Pelves OF RICKETY CHILDREN AS THE PRECURSORS OF THE RICKETY FLAT Pelves OF WOMEN.

BY

HUGH T. ASHBY, B.A., M.D.CAMB., M.R.C.P.LOND.,
VISITING PHYSICIAN TO THE MANCHESTER CHILDREN'S HOSPITAL AND TO THE SALFORD ROYAL HOSPITAL.

It would appear that during the last few years a larger number of women have suffered difficulty at childbirth on account of small pelves, and a larger number of Caesarean sections have been done in lying-in hospitals, than before. This difficulty is accounted for almost entirely by the rickety flat pelves so common in women who have had rickets in childhood. Hitherto little has been written about the normal or the rickety abnormal pelves of children. In order to find

* Read at a meeting of the Section of Anaesthetics, Royal Society of Medicine, November 3rd, 1922. (See also p. 925.)

out when the rickety flat pelvis starts I have made a large number of measurements of the pelves of normal children and compared them with the measurements of pelves of children with rickets. The pelvis of a child with rickets shows little outward signs of any abnormal measurements. In all nearly 150 pelves of normal healthy children of all ages from 1 to 14 years have been examined and the results tabulated.

With callipers as ordinarily used in midwifery the distances were measured between (1) the anterior superior spines of the iliac crest, (2) the iliac crests, (3) the trochanters, and (4) the external conjugate diameter. These measurements are easily made; they show that the pelvis of a normal child slowly and regularly increases in size.

The pelves of over 150 female children with rickets, at all ages from 1 to 14 years, were measured in the same way. On comparing the normal pelves with the rickety some very marked differences were apparent, the most noticeable being the relative smallness of the external conjugate in rickets. This difference becomes more marked as the children grow older; thus at the age of 5 years the external conjugate in normal children averaged 4.8 inches, and in rickety children of the same age only 4.1 inches. At the age of 13 years the external conjugate was 6 inches in normal children and only 4.9 inches in rickety children—a difference of over an inch.

Table giving the Measurements of Normal and Rickety Pelves of Children aged 1 to 14 years.

Age in Years.	Normal.				Rickety.			
	I.S.	I.C.	E.C.	Tr.	I.S.	I.C.	E.C.	Tr.
1 to 2 ...	5.4	5.6	3.8	6.0	4.8	5.2	3.4	5.9
2 to 3 ...	5.8	6.0	3.8	6.3	5.2	5.5	3.4	6.1
3 to 4 ...	5.8	6.1	4.0	6.9	5.3	5.9	3.5	6.5
4 to 5 ...	6.0	6.5	4.0	7.0	5.8	6.2	3.8	6.6
5 to 6 ...	7.0	7.5	4.8	7.9	6.0	6.5	4.1	7.2
6 to 7 ...	7.0	7.5	4.85	8.0	6.2	6.7	4.1	7.15
7 to 8 ...	7.1	7.8	5.1	8.0	7.0	7.5	4.8	8.2
8 to 9 ...	7.1	7.6	5.4	8.0	6.6	7.0	4.6	7.4
9 to 10 ...	7.25	7.5	5.5	8.75	7.75	8.5	5.0	8.5
10 to 11 ...	7.75	8.25	5.75	8.75	7.8	8.8	5.0	9.3
11 to 12 ...	7.75	8.25	5.75	8.75	7.8	8.5	5.0	8.9
12 to 13 ...	8.0	8.5	6.0	9.0	7.8	8.0	4.9	9.4
13 to 14 ...	8.5	9.0	6.5	9.6	8.2	8.2	5.4	9.5

I.S. = Measurement between the iliac spines. I.C. = Measurement between the iliac crests. E.C. = External conjugate. Tr. = Measurement between the trochanters.

This diminution of the external conjugate is the marked feature of the rickety flat pelves of women and the cause of so much difficulty at childbirth. The pelvis, including the sacrum and iliac bones, like the other bones, are softened in rickets and liable to bend under strain. The chief cause of the diminished external conjugate is that the sacrum is bent and displaced forwards by the body weight. The promontory of the sacrum is carried in this way nearer the symphysis. The smallness of the external conjugate in older children shows this clearly, for it is relatively much smaller than at the earlier ages. As the child grows older and heavier the weight pushes the sacrum downwards and forwards towards the symphysis. This diminution of the external conjugate even in early life proves that it is the rickets of early childhood which is the origin of the typical flat pelves of women.

The other measurements, interspinous and intercrural, are not markedly less in rickets than in the normal. After the age of about 9 years the interspinous measurement becomes slightly larger in rickets than in the normal. This is to be explained by the fact that the body weight presses out the iliac crests, so that the iliac fossae look forwards instead of forwards and inwards.

In the rickety flat pelves of adults the measurement between the spines approximates closely to that between the crests, owing to the pressing outwards of the spines by the body weight. This is not so in children until near puberty, when the body weight increases so much. The measurement between the trochanters is greater in rickety than in normal

children, especially after the age of 7 years. This is no doubt due for the most part to coxa vara—a common condition in rickets—but partly to the thickened great trochanter. The average height of the rickety children measured was less than the normal height for age, owing to their lack of development, lordosis, and the curvature of the legs.

The conclusion to be drawn from these measurements is that rickets in early childhood, and continuing during childhood, is the cause of the rickety flat pelves of adult women, and as long as rickets remains prevalent so will there be difficulty and danger with childbirth in a number of women, especially among the populations of large towns.

At present rickets shows little diminution, and the large amount which occurred during the war and since will continue to leave its mark in future years, when these children get married. It is to be hoped that the large amount of work which is being carried out all over the country on the cause and treatment of rickets will diminish its frequency in the future.

I am much indebted to Dr. J. W. Bride for his help and co-operation in this short article.

AN OUTBREAK OF DIPHTHERIA DUE TO INFECTED MILK.

BY

A. E. PORTER, M.D., D.P.H.,

MEDICAL OFFICER OF HEALTH FOR THE BOROUGH AND RURAL DISTRICT OF REIGATE.

MILK-BORNE epidemics of infectious diseases are seldom without points of interest, and a small outbreak of diphtheria, which occurred in the borough of Reigate during December, 1921, and January, 1922, was no exception.

Diphtheria had been somewhat unusually prevalent during 1921, sixty-five cases being notified in a population of slightly under 29,000. Only nine of the patients were above the age of 15; most of them were members of working-class families, and, apart from two small groups, where school infection was prominent, the cases occurred at appreciable intervals, with no obvious connexion one with another.

Between January 4th and 17th, 1922, however, I received notifications of fourteen cases of diphtheria, occurring in thirteen different houses, scattered over various parts of the borough (which has an area of 6,000 acres), every house being supplied with milk from one retailer; there was no other factor in common. Eight of the patients were adults, and nine of the houses were large residences, while two of the patients living in cottages were daily maids in large houses supplied by the same retailer. The attacks among the fourteen patients ranged from December 22nd, 1921, to January 14th, 1922. Six of the fourteen patients were males.

Five individuals were attacked on January 4th, three on January 6th, two on January 7th, and one each on December 22nd and January 1st, 8th, and 14th. A further case, a boy of 6, who was attacked on December 25th and notified on December 27th, also had milk from the same retailer.

Inquiries at the houses showed that all the patients consumed the milk as delivered, though in some of the larger residences milk intended for the children was boiled as a matter of routine. None of these children were attacked.

During January four further cases of diphtheria occurred; one of these, consuming milk from the suspected retailer, was infected whilst in London; the remainder were supplied from other sources. Among the cases notified earlier in December and those notified after January 17th there was no reason for attaching suspicion to any milk supply. This particular outbreak may therefore be considered to include fifteen cases in fourteen different dwellings.

I began to suspect that milk was the source of infection about January 9th, and on January 10th I wrote to all the general practitioners suggesting that as opportunity offered they should recommend their patients to boil all milk delivered, and I issued a letter in the local weekly newspaper on January 13th advocating the same precaution. From a purely scientific point of view this may have been regrettable, but the measure was justified by subsequent occurrences.

The implicated retailer sends out about 450 gallons a day, and supplies some 2,100 houses. The milk is derived from thirteen different farms, situated in Surrey, Sussex, and Kent.