tion, since Case 8 had a comparatively slow rate at the same time as severe hypoxia (Fig. 3), and in Case 1 the rate increased further on oxygen-breathing, probably owing to correction of hypoxic depression of the respiratory centre.

Breathing oxygen always caused a rise in arterial P_{O_2} to above 100 mm. Hg; the slight rise in P_{CO_2} which usually occurred was in the expected direction but of no clinical significance, and should not lead to hesitation in administering oxygen therapy.

Summary

A study is reported of the arterial oxygen and carbon-dioxide tensions of 12 babies, aged 5 weeks to 7 months, with acute disease of the lower respiratory tract.

Sampling from the brachial artery, an established technique in the adult, has proved to be a safe procedure in this age-group. The method employed is described.

All the babies had hypoxia, and in some cases this was very severe; in six of them there was evidence of carbon-dioxide retention. It is likely that these abnormalities were primarily due to uneven ventilation: perfusion ratios in the lungs, resulting from airway obstruction.

Cyanosis and the respiratory rate are both fairly good clinical indices of the severity of the hypoxia in most cases. However, there are occasions when these observa-

tions may be seriously misleading, and they must be interpreted with caution.

The administration of 100% oxygen to breathe for 30 minutes always caused an increase of arterial oxygen tension to above 100 mm. Hg. No clinically significant rise in carbon-dioxide tension was produced.

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INFLUENCE OF ANAESTHESIA ON THE INCIDENCE OF MATERNAL MORBIDITY, NEONATAL ASPHYXIA, AND PERINATAL MORTALITY

BY

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General anaesthesia is nowadays responsible for only a small number of maternal deaths, and this number is diminishing; thus there were 19 maternal deaths in England and Wales due to the complications of anaesthesia in 1954, but only eight in 1957 (Walker *et al.*, 1957, 1960). However, general anaesthesia is probably responsible for a much greater amount of maternal morbidity, possibly for some perinatal deaths, and it may increase the incidence of neonatal asphyxia; but accurate information is lacking, and this is essential if the risks to mothers and babies associated with obstetric operations are to be reduced. Information that will enable the advantages and disadvantages of various anaesthetic techniques to be assessed is required, so that the safest anaesthetic can be chosen to suit the circumstances. The problems involved in obtaining this information are complicated (Crawford, 1962), since the type of anaesthetic must be correlated with the experience of the anaesthetist, the time taken for the induction, as well as with the post-operative state of the mother and the condition of the baby at birth. The indications for and the nature of the operative assistance must also be considered in addition to other factors, such as associated maternal disease, the length of labour, the presence of toxæmia, etc. An attempt has therefore been made to evaluate the advantages and disadvantages of local analgesia and general anaesthesia of three different types by assessing the incidence of maternal morbidity, neonatal asphyxia, and perinatal mortality.

Method of Inquiry

The analysis is based on the records of all the patients delivered in St. Thomas's Hospital and on the records of those women delivered with operative assistance in the General Lying-In Hospital from August 1, 1959, to December 31, 1960. The same obstetric and anaesthetic team was responsible for the management of patients in both hospitals. The relevant data were entered on punch-cards, which were completed at the delivery of each patient.

The nature of the anaesthetic used was determined by the preference of the individual anaesthetist, taking into consideration the condition of the patient. A survey of the case records showed that there was no difference between the various groups with regard to the incidence of associated maternal disease, toxæmia, the length of labour, or the time and amount of analgesic drugs given during labour. If pudendal nerve block was used, it was induced by the obstetrician. Three different types of general anaesthetic were employed.

1. Anaesthesia was induced with cyclopropane and oxygen, with the patient's whole body tilted head up; after relaxation had been obtained with intravenous suxamethonium, a cuffed endotracheal tube was passed. The anaesthetic was maintained with nitrous oxide and oxygen, and, if necessary, further doses of suxamethonium (Wylie and Churchill-Davidson, 1960).

2. Anaesthesia was induced with the minimum quantity of intravenous sodium thiopentone which was just sufficient

to produce insensibility, and after relaxation had been obtained with suxamethonium an endotracheal tube was passed. The anaesthetic was maintained with a mixture of nitrous oxide and oxygen and further doses of suxamethonium (Wylie and Churchill-Davidson, 1960).

3. Anaesthesia was induced and maintained with a mixture of nitrous oxide, oxygen, and ether.

These are subsequently referred to as the cyclopropane, thiopentone, or ether technique.

The anaesthetics were usually given by a middle-grade registrar, some were given by consultants and senior registrars, and some by senior house officers, but the latter were always supervised by a more senior member of the anaesthetics department. Although it is recognized that the results and effects of general anaesthesia bear a direct relation to the skill and experience of the anaesthetist, no attempt has been made to analyse the results from this point of view, because the resulting groups of patients would be too small and because the supervision of the more junior anaesthetists served to compensate for their lack of experience.

Maternal morbidity was assessed by a member of the anaesthetics department on the first and third days after delivery. Two anaesthetists were responsible for the assessment of maternal morbidity, but the same person examined individual patients. Initially an attempt was made to assess the incidence of post-anaesthetic pulmonary complications by taking a chest x-ray film on the third day after delivery. However, this was abandoned as a routine investigation after two months, because the information it provided did not justify the time and effort expended and no radiological abnormality was found during this time.

The state of the baby at birth and any measures employed for its resuscitation were recorded by the doctor or midwife responsible for the delivery, who classified the babies into one of the four categories used in the Midwifery Department of the University of Aberdeen (Craig and Fraser, 1957), as follows.

Class A: The baby is in very good condition at birth, and cries lustily within 30 seconds; apart from mucus extraction, no resuscitation is needed. If there was the slightest doubt concerning the excellence of the babies' condition, they were not included in this category.

Class B: The baby's condition is good, recovering to class A within three minutes. Such babies may be blue at

birth, but they respond quickly to skin stimulation and clearing of the airway.

Class C: The baby's condition is only fair, with absent or gasping respiration, and active methods of resuscitation are needed, such as intragastric oxygen (this was still being used in both hospitals at that time) or endotracheal intubation with assisted positive-pressure artificial respiration. The child responds reasonably quickly to these measures and recovers to class B within 30 minutes.

Class D: The baby is seriously asphyxiated; respiration is absent, the skin pale, muscle tone poor, and the heart-beat feeble and irregular. There is only a slow response to active methods of resuscitation, and the baby's condition remains poor after 30 minutes.

Maternal Morbidity

From August 1, 1959, to December 31, 1960, there were 1,330 deliveries in St. Thomas's Hospital and 2,091 in the General Lying-In Hospital—a total of 3,421 deliveries (Table I). There were no maternal deaths. In 367 (10.7%) cases delivery was by forceps; in 169 of these (46%) pudendal-nerve block was used. There were 167 caesarean sections (14.9%), all of them performed under general anaesthesia; 53 (32%) of these patients were properly prepared for the anaesthetic—that is, they were not in labour and they had received no food or fluid for at least four hours before the

TABLE I.—Details of Patients Delivered in St. Thomas's and the General Lying-in Hospitals from August 1, 1959 to December 31, 1960.

	St. Thomas's	G.L.I.	Total
No. of deliveries	1,330	2,091	3,421
No. of maternal deaths	32	40	72
Stillbirths	(24.0)	(18.9)	(21.0)
Neonatal deaths	19	29	48
(Neonatal death rate per 1,000 live births)	(14.3)	(14.0)	(14.0)
Perinatal mortality rate per 1,000 total births	38.3	32.6	35.0
Forceps deliveries	195	172	367
(Forceps rate %)	(14.7)	(5.9)	(10.7)
(Associated perinatal mortality rate per 1,000)	(41.0)	(34.9)	(38.1)
Breech deliveries	38	56	94
(Breech delivery rate %)	(2.9)	(1.9)	(2.7)
(Associated perinatal mortality rate per 1,000)	(211.0)	(250.0)	(234.0)
Twin deliveries	17	27	44
(Twin delivery rate %)	(1.3)	(1.3)	(1.3)
(Associated perinatal mortality rate per 1,000)	(88.2)	(148.0)	(125.0)
Caesarean sections	95	72	167
(Caesarean section rate %)	(7.2)	(3.5)	(4.9)
(Associated perinatal mortality rate per 1,000)	(84.4)	(97.2)	(89.6)
Post-partum haemorrhage*	118	130	248
(Post-partum haemorrhage rate %)	(8.9)	(6.2)	(7.3)

* Blood loss of 20 oz. (570 ml.) or more.

TABLE II.—Incidence of Maternal Complications Related to the Anaesthetic Used for Forceps Delivery and Caesarean Section in St. Thomas's and the General Lying-in Hospitals from August 1, 1959, to December 31, 1960

	Pudendal Block	Forceps			Caesarean Section				
		General Anaesthesia (198)			Emergency (114)			Elective (53)	
		Cyclopropane	Thiopentone	Ether	Cyclopropane	Thiopentone	Ether	Cyclopropane	Thiopentone
No. of cases	169	127	35	36	67	42	5	13	40
No. available for analysis	133	102	26	27	44	27	2	8	30
Post-partum haemorrhage	7	19	4	5	—	—	—	—	—
Regurgitation of stomach contents	—	3	1	—	1	—	1	—	—
Inhalation of vomit	—	1	—	—	3	—	1	1	—
Bronchopneumonia	—	2	—	1	3	11	—	3	9
Sore throat	—	40	9	3	16	—	—	—	6
Dry cough	—	4	4	—	11	5	—	—	7
"Suxamethonium pains"	—	25	4	—	2	3	—	1	5
Injection haematoma	—	6	2	—	2	4	—	—	2
Post-anaesthetic vomiting	—	5	1	—	6	—	—	—	—
Perineal haematoma	1	—	—	—	—	—	—	—	—
Failed because of lack of maternal co-operation	2	—	—	—	—	—	—	—	—
Mean total G.A. time in minutes	—	48.6	46	46	50.4	58.6	45.5 } 90 } 45 }	65.8	54.4
Mean induction-delivery time in minutes	—	(a) 13.8 ± 4.8	(b) 15.8 ± 5.7	(c) 26.7 ± 10.3	14.7	16.8	10.5 } 45 }	15.5	16.0
Difference of means	—	a-b=2	a-c=12.9*	b-c=10.9*					
Standard error of difference	—	1.5	2.4	2.74					

*These differences are statistically significant.

operation. The remaining 114 (68%) caesarean sections were performed as emergency operations on unprepared patients. There were 44 twin deliveries and 94 breech deliveries; these groups are too small for detailed analysis, particularly as they include a large number of premature babies, malformed and stillborn infants, etc.

A post-partum haemorrhage (Tables I and II) occurred in 248 of all the patients (7.3%), and in 7 out of 133 (5.3%) delivered with forceps under pudendal nerve block; this difference is probably significant (using the χ^2 test, $P=0.02-0.01$). The lower incidence of post-partum haemorrhage in patients delivered with forceps under pudendal nerve block compared with the total incidence may be accounted for by the fact that the former were given 0.5 mg. of ergometrine intravenously with the delivery of the anterior shoulder of the baby, whereas it was given only to selected patients (prolonged labour, grand multiparae, etc.), who were delivered spontaneously. Of 155 patients delivered with forceps under general anaesthesia, 28 (17%) had a post-partum haemorrhage. The difference in the incidence of post-partum haemorrhage in patients delivered with forceps under pudendal-nerve block compared with those delivered under general anaesthesia is significant ($P<0.001$); it cannot be attributed to ergometrine, since both groups were given it. It must therefore be due to other factors, such as the length of labour, the difficulty of delivery, or the type of anaesthetic used. As there was no difference in the incidence of post-partum haemorrhage with the various types of general anaesthetic used—cyclopropane 18.6%, thiopentone 15%, and ether 18%—it is suggested that the length of labour and difficulty of delivery may have been of greater importance in causing the increased incidence of post-partum haemorrhage than the type of general anaesthetic used.

Other complications associated with the various types of anaesthetic used for forceps delivery and caesarean section are summarized in Table II. All the techniques of general anaesthesia were associated with the regurgitation of stomach contents (cyclopropane on four occasions, thiopentone once, and ether once), and the patients were therefore exposed to the risk of pulmonary aspiration, which occurred twice in the series (once with ether and once with cyclopropane). The incidence of post-anaesthetic pneumonia was 3%: it occurred in 6 out of 154 (3.9%) patients anaesthetized with cyclopropane, in 1 out of 83 given thiopentone (1.2%), and in 1 out of 29 (3.4%) anaesthetized with ether. None of these differences is statistically significant. Of 237 women in whom anaesthesia was induced with either cyclopropane or thiopentone 175 (73%) suffered minor post-anaesthetic discomforts, such as a sore throat and a dry cough—presumably the result of intubation—muscle pains attributable to suxamethonium, and haematomata at the site of intravenous injections; whereas only three patients (10.3%) anaesthetized with ether had a sore throat. Post-operative vomiting was uncommon; it occurred in 18 of the 237 (7.5%) patients anaesthetized with cyclopropane or thiopentone, and, surprisingly, in none of those who were given ether.

The most rapid method of inducing anaesthesia for forceps delivery was the cyclopropane technique; the average interval between beginning the anaesthetic and the delivery of the infant was 13.8 minutes with cyclopropane, 15.8 minutes with thiopentone, and 26.7 minutes with ether. The standard errors of the difference between the mean times of cyclopropane and ether and of thiopentone and ether are significant (Table II).

Neonatal Asphyxia

The total incidence of the various degrees of neonatal asphyxia was assessed by recording the condition at birth of all the babies born in St. Thomas's Hospital between August, 1959, and December, 1960. The results are summarized in Table III. It is interesting to note that female infants were born in a better state than males. Thus of the 897 class A babies the ratio of males to females was 434:463; whereas in classes B, C, and D there were more males than females, and in class D there were twice as many males as females. The reversal of the sex ratio of infants in classes A+B compared with those in classes C+D is statistically significant, but cannot be accounted for. As the severity of asphyxia increased, the neonatal death rate rose significantly from 2.2 in class A to 46.1 per thousand births in class D.

TABLE III.—Condition at Birth of Babies Born Alive in St. Thomas's Hospital from August, 1959, to December, 1960

Degree of Neonatal Asphyxia	No.	Sex Ratio M : F	Neonatal Deaths (Rate per 1,000)
A	897 (68.7%)	434 : 463	2 (22)
B	284 (21.7%)	150 : 134	6 (21)
C	104 (7.9%)	63 : 41	5 (48)
D	13 (1.7%)	9 : 4	6 (461)
Degree of Asphyxia Compared	No of Males %	χ^2 n=1	P
A:B	48.3 : 52.8	1.7	0.2-0.1
A:C	48.3 : 60.5	5.8	0.02-0.01
A:D	48.3 : 69.3	132.3	<0.001
B:C	52.8 : 60.5	1.8	0.2-0.1
B:D	52.8 : 69.3	1.3	0.3-0.2
C:D	60.5 : 69.3	0.034	0.8-0.7
A+B:C+D ..	49.4 : 61.5	6.2	0.02-0.01
Degree of Asphyxia Compared	Incidence of Neonatal Deaths %	χ^2 n=1	P
A:B	0.2 : 2.1	10.7	0.01-0.001
A:C	0.2 : 4.8	29.6	<0.001
A:D	0.2 : 46.1	357.1	<0.001
B:C	2.1 : 4.8	1.8	0.2-0.1
B:D	2.1 : 46.1	44.6	<0.001
C:D	4.8 : 46.1	7.3	0.01-0.001
A+B:C+D ..	0.7 : 9.4	56.6	<0.001

Table IV shows that there was a significant increase in the number of babies who were delivered by operative means as the degree of asphyxia became more severe.

Nevertheless, 48 (4.9%) of 984 babies born spontaneously were severely asphyxiated at birth (classes C+D). Therefore, although operative intervention and anaesthesia are associated with a significant increase in the incidence of neonatal asphyxia, they are not the only responsible factors. There was no significant association between the degree of asphyxia and the type of operative assistance, which suggests that the nature of the operation and the indication for it were of no importance in the differences observed.

The incidence of severe neonatal asphyxia increased significantly when general anaesthesia was used rather than pudendal nerve block for forceps delivery, and particularly if ether was the anaesthetic agent (Table V). There was no difference in the incidence of severe asphyxia when the use of cyclopropane and of thiopentone were compared.

The condition at birth of the babies who were delivered by forceps and caesarean section was analysed according to the indications for the operation, the technical difficulties involved, and the type of anaesthetic used. However, none of the groups is large enough to allow a valid statistical comparison. Except that when the indication for forceps delivery was foetal distress there were signi-

ificantly fewer severely asphyxiated babies if pudendal nerve block (4 of 47) was used than if cyclopropane (12 of 26) was given. This difference is probably not attributable to the type of anaesthetic given, but to the larger number of easy outlet forceps deliveries carried out under pudendal nerve block; these babies could therefore be extracted more quickly and with less manipulation. When delay in the second stage of labour was the indication for forceps delivery there were significantly fewer severely asphyxiated babies if pudendal nerve block (11 of 86), cyclopropane (17 of 75), or thiopentone (4 of 23) was used than when ether (22 of 26) was used. The difficulty of the forceps deliveries

in the cyclopropane, thiopentone, and ether groups was comparable; however, more easy outlet forceps deliveries were conducted under pudendal nerve block than when a general anaesthetic was used.

Perinatal Deaths

Eight stillborn babies were delivered with forceps: all of them had died before the anaesthesia was begun. Three infants delivered by caesarean section because of foetal distress in the first stage of labour were stillborn: in two, anaesthesia was induced with cyclopropane, and the cause of death was intra-partum pneumonia; in the other baby anaesthesia was induced with thiopentone, and it died of intrauterine asphyxia, which was attributed to placental insufficiency.

Six babies who were delivered with forceps died after birth: two of prematurity, one of intracranial haemorrhage, and one of congenital abnormalities; necropsy showed atelectasis in two, one of whom was delivered because of foetal distress under cyclopropane anaesthesia, and the other because of delay in the second stage of labour under pudendal nerve block. In one child, delivered because of foetal distress under pudendal nerve block, no cause for death was found. Twelve babies delivered by caesarean section subsequently died: four of hyaline membrane, two of rhesus incompatibility, two of prematurity, one (premature) of bronchopneumonia, one because of ruptured vasa praevia, one of intrauterine asphyxia caused by massive bleeding from a placenta praevia, and one of congenital abnormalities.

Thus in only one of the babies delivered with forceps might the anaesthetic have had anything to do with its death. And, similarly, in only one of the babies delivered by caesarean section could the anaesthetic have possibly been a contributory cause. In both these cases it could be argued that the general anaesthetic aggravated the already existing intrauterine asphyxia caused by placental insufficiency.

Discussion

Although some of the groups of figures are small the results are considered instructive and valid because the series is uniform in that it represents the work, in two closely allied units over a reasonable length of time, of a relatively small team of anaesthetists and obstetricians with comparable experience and ability. These figures demonstrate that the incidence of maternal morbidity following operative delivery was greater when a general anaesthetic was used. Pudendal nerve block was associated with less risk of post-partum haemorrhage, and there were virtually no complications directly attributable to it. All three types of general anaesthetic used in this series were associated with the regurgitation of abdominal contents, and the patients were therefore exposed to the risk of inhalation of gastric contents and its possible sequelae—bronchopneumonia, lung abscess, and Mendelson's (1946) syndrome. The incidence of minor discomfort associated with cyclopropane or thiopentone anaesthesia was very much higher than when ether was used.

The incidence of severe neonatal asphyxia was least when local analgesia was used for forceps delivery; the figures presented here confirm those of Lister and Buchanan (1957). Although the cyclopropane and thiopentone techniques were associated with more neonatal asphyxia than pudendal nerve block, the incidence was

TABLE IV.—Degree of Neonatal Asphyxia Related to Method of Delivery of Babies Born in St. Thomas's Hospital from August, 1959, to December, 1960

Degree of Neonatal Asphyxia	Method of Delivery				Total
	Spontaneous	Forceps	Breech	Caesarean Section	
A	744	97	9	47	897
B	192	59	10	23	284
C	44	34	7	19	104
D	4	2	2	5	13
Stillbirths	18	3	10	1	32
Total	1,002	195	38	95	1,330

Degree of Asphyxia Compared	Incidence of Operative Assistance %	χ^2 n=1	P
A:B	17.0: 32.4	27.9	<0.001
A:C	17.0: 57.7	91.1	<0.001
A:D	17.0: 69.3	15.9	<0.001
B:C	32.4: 57.7	18.4	<0.001
B:D	32.4: 69.3	7.6	0.01—0.001
C:D	57.7: 69.3	0.6	0.5—0.3
A+B:C+D	20.7: 58.9	70.7	<0.001

Method of Delivery Compared	Incidence of Severe Asphyxia (C+D) %	χ^2 n=1	P
Spontaneous: operative	4.9: 21.9	591.5	<0.001
Spontaneous: forceps	4.9: 18.7	46.7	<0.001
Spontaneous: breech ..	4.9: 32.2	37.3	<0.001
Spontaneous: caesarean	4.9: 25.5	13.6	<0.001
Forceps: breech	18.7: 32.2	2.7	0.1
Forceps: caesarean ..	18.7: 25.5	1.8	0.2—0.1
Breech: caesarean ..	32.2: 25.5	0.97	0.5—0.3

TABLE V.—Incidence of Neonatal Asphyxia Related to Anaesthetic Used for Forceps Delivery in St. Thomas's and the General Lying-in Hospitals from August, 1959, to December 1960

Method of Delivery	Degree of Asphyxia		Total
	Mild (A+B)	Severe (C+D)	
Forceps—cyclopropane	72	30	102
Forceps—thiopentone	19	7	26
Forceps—ether	5	22	27
Total forceps—G.A.	96	59	155
Forceps—pudendal block ..	118	15	133
Total forceps	214	74	288
Spontaneous (St. Thomas's only)	936	48	984

Method of Delivery Compared	Incidence of Severe Asphyxia (C+D)%	χ^2 n=1	P
Spontaneous: forceps—pudendal	4.9: 11.3	9.0	0.01—0.001
Spontaneous: forceps—G.A. ..	4.9: 38.0	189.0	<0.001
Forceps—pudendal: forceps—G.A. ..	11.3: 38.0	27.8	<0.001
Forceps—pudendal: forceps—cyclopropane	11.3: 33.2	27.0	<0.001
Forceps—pudendal: forceps—thiopentone	11.3: 26.9	11.7	<0.001
Forceps—pudendal: forceps—ether	11.3: 81.5	63.2	<0.001
Forceps—cyclopropane: forceps—thiopentone	33.2: 26.9	0.038	0.9—0.8
Forceps—cyclopropane: forceps—ether	33.2: 81.5	25.1	<0.001
Forceps—thiopentone: forceps—ether	26.9: 81.5	16.0	<0.001

greater still when ether was used, thus confirming the results of Hodges *et al.* (1959, 1960). As the skill of the anaesthetist, the type of delivery, the indications for the use of forceps, and the preceding circumstances were as nearly comparable as possible in these groups, it seems reasonable to conclude that the anaesthetic agent played some part in the varying state of these babies at birth. The induction of general anaesthesia for forceps delivery was significantly quicker with cyclopropane or thiopentone than with ether. This means that the babies were exposed for a relatively shorter time to the anaesthetic agent with the two former techniques, and it may have been the time factor alone which accounted for the better state of these babies at birth. It must, however, be admitted that if the time involved in making the preparations for giving the anaesthetic had been taken into account there would have been very little difference between the three techniques in regard to the speed with which the baby was delivered. Nevertheless, the shorter time the babies were exposed to cyclopropane and thiopentone was a distinct advantage from their point of view. Compared with ether, which was given continuously over a much longer time and which would have been eliminated much more slowly, cyclopropane and thiopentone were used in only relatively small doses given rapidly to induce sleep, and they would therefore have been eliminated very quickly, possibly even before they had time to reach the baby's respiratory centre.

The method of choice for forceps delivery is local analgesia because it is associated with a lower incidence of post-partum haemorrhage, maternal morbidity, and neonatal asphyxia than when a general anaesthetic is used; this fact has long been recognized in the United States (Hingson and Hellman, 1956; Apgar *et al.*, 1957; James *et al.*, 1958); but it has, at least until recently, been acknowledged only with reluctance in this country, although, among others, Gate and Dutton (1955), Scott and Gadd (1957), and Huntingford (1959) have shown that a higher percentage of forceps deliveries, including forceps rotations, can be performed satisfactorily under pudendal nerve block.

As has frequently been said (Walker *et al.*, 1957, 1960; Wylie, 1961), obstetric anaesthesia should be the responsibility of skilled and experienced anaesthetists and not be delegated to juniors early in their training. The dangers associated with the regurgitation of gastric contents can be greatly reduced if the anaesthetic is given by a skilled person using a technique with which he is thoroughly familiar; and if these conditions are fulfilled it seems to make very little difference what anaesthetic is used. However, the lower incidence of neonatal asphyxia associated with cyclopropane and thiopentone compared with ether is a considerable advantage which is not offset by the higher incidence of minor complications.

Summary

The incidence of maternal morbidity, neonatal asphyxia, and perinatal mortality associated with 169 forceps deliveries using pudendal nerve block, and with 198 forceps deliveries and 167 caesarean sections using three different types of general anaesthesia (induction with either cyclopropane or thiopentone, or induction and maintenance with ether, nitrous oxide and oxygen), in St. Thomas's Hospital and the General Lying-In Hospital between August, 1959, and December, 1960, were assessed and compared.

The following observations were made. (1) The incidence of post-partum haemorrhage was lower with

pudendal nerve block (5.3%) than with general anaesthesia (17%). (2) All three types of general anaesthesia were associated with the regurgitation of gastric contents. (3) The time between the induction of anaesthesia and the delivery of the infant with forceps was shorter with cyclopropane (13.8 minutes) and thiopentone (15.8 minutes) than with ether (26.7 minutes). (4) Male infants were more liable to be severely asphyxiated at birth than females. (5) The degree of neonatal asphyxia increased with the incidence of and need for operative intervention. (6) The incidence of severe neonatal asphyxia associated with forceps delivery was least when it was performed under pudendal block (11.3%), significantly greater with cyclopropane (33.2%) and thiopentone (26.9%), and greatest when ether (81.5%) was used. (7) No association could be found between the perinatal deaths and the type of anaesthetic used.

It is concluded that local analgesia should be used whenever possible for forceps delivery because it is associated with less danger both for the mother and for the baby than general anaesthesia. Only skilled and experienced anaesthetists should be responsible for obstetric anaesthetics. The use of ether is associated with a high incidence of post-partum haemorrhage and severe neonatal asphyxia; further, induction with ether is slow and unpleasant for the patient. For these reasons ether is not considered to be the general anaesthetic agent of choice for operative delivery.

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According to reports in the press local authorities are proving slow to approve the fluoridation of water supplies in order to prevent dental decay. Recently the Ministry of Health issued through local authorities and other organizations a useful little booklet about fluoridation—the process of adding fluoride to water supplies to bring the natural content up to the concentration needed for dental protection. Besides containing a concise introduction to the subject, the booklet answers nine questions commonly asked by members of the public.