two months of medical treatment the loss of weight continued and ascites recurred after repeated tapping. He was transferred to the surgical side on March 22, 1952. The laboratory findings then were: total protein 6.2 g.% (albumin 2.6 g., globulin 3.6 g.); prothrombin 50%. After treatment with vitamin K and blood transfusion, peritoneoscopy was done on April 1 to confirm the diagnosis. After further fresh blood transfusion the prothrombin rose to 65%.

Operation was performed on April 16. The abdomen was entered through a right rectus incision. About a litre of clear fluid was evacuated. The liver was small and hard, with rounded borders and grossly granular surface. The gall-bladder was small and thick-walled. The hepato-duodenal ligament was carefully dissected and the hepatic artery was found and freed. Three branches were identified: the right branch, and two smaller ones directed to the left and middle (quadrate) lobes. The portal pressure measured from an ommental vein was 365 mm. of heparinized saline. After occlusion of the three hepatic branches with bulldog clamps the portal pressure fell to 254 mm. The two branches to the left and middle lobe were ligated with No. 1 linen ligatures and the larger branch to the right lobe was wrapped with two turns of a cellophane band treated with dicetyl phosphate. The arteries were buried in the hepato-duodenal ligament with three stitches of 000 silk, and the abdomen was closed without drainage.

The post-operative course was uneventful except for a haematoma of the wound followed by a small dehiscence which was repaired on May 28. The abdomen was tapped once, on May 20, to avoid the danger of a post-operative hernia, and 800 ml. of fluid was withdrawn. The patient had a normal diet from the sixth post-operative day, and by the time of his discharge from hospital on June 23 he was eating well, had normal bowel movements, and a slight amount of fluid was present in his abdomen. He had gained 1 kg. in weight.

He was seen again on September 25, when he was feeling well, had gained 5 kg. in weight since discharge, and was eating well. He had slight constipation, which he corrected with some laxatives. No jaundice was present and the venous collateral circulation on his abdomen had almost completely disappeared. He had not been tapped since his discharge from hospital, and a small amount of fluid was detectable. The plasma protein at this time was 7.39 g.% (albumin 2.97 g., and globulin 4.42 g.).

The favourable result of this first case supports the belief that the method, which was developed experimentally, is worthy of further clinical application.

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The physiology of vision is the subject of a dozen articles in the current issue of the *British Medical Bulletin*. Sir John Parsons, F.R.S., consulting surgeon to the Royal London Ophthalmic Hospital, contributes a preface which draws attention to some of the implications of modern research into vision. A mechanism that corrects the lens system of the eye so as to overcome chromatic aberration is the subject of an article by Professor H. Hartridge, F.R.S. Professor A. Sorsby discusses the nature of refractive errors, and Dr. Hugh Davson some problems of the formation and circulation of aqueous humour. In this connexion Sir John Parsons suggests in the introduction that further knowledge of the production of aqueous humour may have a bearing on the formation of cerebrospinal fluid and of lymph production in general. A useful bibliography of British books and periodicals concerned with the physiology of vision is included. The *Bulletin* is published by the British Council; the price of the current number is 15s.

TRICHLORETHYLENE IN LABOUR

BY

E. E. RAWLINGS, M.D., M.R.C.O.G.

Consultant Obstetrician and Gynaecologist, Hope Hospital, Salford

Browne *et al.* (1951) described the use of Steel's inhaler for administering trichlorethylene in labour. Commenting on this, the *British Medical Journal* (1951) stated: "The argument over analgesia in labour creaks on . . . Steel's inhaler . . . unfortunately does not contain all the safeguards generally considered necessary for its use . . . by a midwife." I wish, therefore, to describe the results obtained with a "Tecota" inhaler (manufactured by Cyprane Ltd.), which contains many of these safeguards and apparently fulfils most of the specifications laid down by the Medical Research Council. The machine used is readily portable and delivers a concentration of vapour of 0.45% trichlorethylene in air with

Trichlorethylene

PATIENT'S NAME.....	DATE.....
TIME COMMENCED.....	CERVIX.....dilated (PR/PV)
TIME FINISHED.....	
DURATION.....HRS.....MINS.	
USED FOR BIRTH OF HEAD { YES NO	EFFECT: Satisfactory Unsatisfactory
BABY: First cried.....minutes after birth.	
Resuscitation needed by MIDWIFE { YES NO	
DOCTOR { YES NO	
F. Hts.....Regular.....Irregular.....	
MOTHER: Co-operation: Average Fair Poor	
Ill-effects (e.g., irregular pulse, giddiness, or anaesthesia)	
After-effects:	
RELIEF: Patient's opinion: Very good Good Fair Poor	
Attendant's opinion:	
REMARKS:	

a variation of about 10% with temperature and normal breathing rates. The concentration is within these limits in all working positions and after shaking or inversion of the apparatus. The concentration falls to about 0.4% for breathing rates below a minute volume of 7 litres.

The investigation was instituted primarily to ascertain if the machine could be used safely by unsupervised midwives, and, secondarily, to attempt to assess its efficiency and detect its disadvantages. There are many drawbacks to such an investigation. On the one hand, the subjects are often extremely impressionable, and, on the other hand, one has to allow for the varying standards and enthusiasms of different observers. The present series of 400 cases is a personal one. All the patients were seen by me during labour and/or interviewed by me 24 hours later. The form reproduced here was completed for each patient by the supervising midwife immediately after delivery. The main points were that the administration was not begun until the cervix was dilated at least three fingerbreadths and was discontinued after six hours. The machine was charged with 30 ml. for each case and not refilled during that time. Chloral and bromide, and pethidine, were often used as premedication, but no drug was given once

the administration of trichlorethylene had begun. The results are presented on lines similar to those in the survey undertaken by the Royal College of Obstetricians and Gynaecologists (1947).

Type of Case

There was no selection of the 400 cases. Any patient who had been certified by the doctor as "fit for gas and air" was given trichlorethylene if a machine was available. The age incidence and the parity of the patients are shown in Tables I and II. Of all the hospital deliveries approximately 54% are primigravidae and 46% are multiparae. The reason

TABLE I.—Age Groups

Age:	20 and Under	21-25	26-30	31-35	36 and Over	Total
No.:	87 (21.75%)	138 (34.5%)	106 (26.5%)	40 (10%)	29 (7.25%)	400

TABLE II.—Parity

Primigravidae	1-para	2-para and Over	Total
295 (73.75%)	65 (16.25%)	40 (10%)	400

for the preponderance of primigravidae in the series is the fact that many of the multiparae were delivered so soon after admission that trichlorethylene was not given, or was used for less than the required minimum period of 20 minutes.

Efficacy of the Analgesia

The mothers were questioned immediately after delivery, and again 24 hours later; their opinions are shown in Table III. In 16 cases (4%) reflection caused the mother

TABLE III.—Mother's Opinion of the Efficacy of the Analgesia

Very Good	Good	Fair	Poor	Total
135 (33.75%)	155 (38.75%)	80 (20.0%)	30 (7.5%)	400

to take a more favourable view of the analgesia, and in 10 (2.5%) the reverse occurred. However, in these cases the more unfavourable opinion has been accepted for the analysis. Adequate analgesia (very good or good relief) was obtained in 290 cases (72.5%) and inadequate relief (fair and poor) in the remaining 110 (27.5%). In the observer's opinion (Table IV) adequate analgesia was obtained in 294 cases

TABLE IV.—Observer's Opinion of the Analgesia

Very Good	Good	Fair	Poor	Total
92 (23%)	202 (50.5%)	91 (22.75%)	15 (3.75%)	400

(73.5%) and inadequate relief in 106 (26.5%). Tables III and IV show a discrepancy in the numbers in the very good, good, and poor columns, although the combined figures for adequate and inadequate analgesia are very similar. This is probably due to the fact that the mother who has no previous experience to guide her is less likely than the trained observer to be addicted to moderation in her opinions.

In interpreting the results shown in Table V it must be remembered that many of the labours in which the adminis-

TABLE V.—Effect of Duration of Analgesia on its Efficacy

Period of Administration	Adequate Analgesia Very Good and Good	Inadequate Analgesia Fair and Poor	Total
Less than 2 hours	184 (75.7%)	59 (24.3%)	243
2-4 hours	76 (73.1%)	28 (26.9%)	104
More than 4 hours	34 (64.2%)	19 (35.8%)	53

Note: Cases in which trichlorethylene was administered for less than 20 minutes have been excluded from the series.

tration lasted for more than four hours were in themselves long and often complicated by uterine inertia or terminated in operative delivery, factors which in themselves would lead the mothers to take a more pessimistic view of the analgesia. On the other hand, a short administration often indicated a reasonably quick labour, with the greater likelihood of a satisfactory opinion of the analgesia.

Effect of Analgesia on Course of Labour

Co-operation of Patient.—A few of the mothers refused the trichlorethylene after a few breaths. Typical comments were: "Cannot get my breath," "Instinct told me to pull it off," "Feel as if I am choking." These cases have been excluded, as the trichlorethylene was not administered for the minimum of 20 minutes. The exact number of such cases is not known, but the estimate is between 10 and 20. Apart from this, lack of co-operation occurred in two groups of cases. In the first group analgesia was excellent, but the patient became too sleepy to push during the second stage. This occurred in five cases (1.25%). The second and larger group consisted of mothers who used trichlorethylene reasonably well until the contractions became more severe late in the first stage or during the second stage, when, owing to inadequate analgesia or slow progress of the labour, they became very restless or hysterical. There were 27 such women (6.75%), in only two of whom did the observer consider that the excitable state might have been produced by the trichlorethylene.

Delay in Labour Due to the Analgesia.—The length of labour in 400 cases having trichlorethylene is compared with a similar group of 400 women the conduct of whose labours did not include the administration of trichlorethylene. These are termed "controls" (Table VI). Of the cases of uterine

TABLE VI

	Trichlorethylene		Controls	
	Primi-gravidae	Multi-parae	Primi-gravidae	Multi-parae
	Hrs. Mins.	Hrs. Mins.	Hrs. Mins.	Hrs. Mins.
Length of 1st stage	20 —	12 5	19 —	11 15
" 2nd "	1 5	— 22	— 58	— 17
Total length of labour	21 5	12 27	19 58	11 32

inertia it was considered that in six the trichlorethylene probably was the major factor in production of the inertia. In all these cases the administration had begun rather early in the labour.

Forceps Rate.—Forceps were used in 1 of the 105 multiparae (1%) and in 27 of the 295 primigravidae (9.2%), a total of 28 out of 400 cases (7%). The forceps rate for the hospital is 5.3%. The increase for the trichlorethylene series can be entirely accounted for by the high percentage of primigravidae in the series.

Primary Post-partum Haemorrhage.—This is defined as a loss of more than 20 oz. (570 ml.) within 24 hours of delivery. There were 12 cases (3%). The incidence of post-partum haemorrhage for the hospital, if one excludes emergencies admitted because of post-partum haemorrhage, is 3.8%.

Conclusions.—Trichlorethylene does not appear to increase the operative delivery rate or predispose to post-partum haemorrhage. Occasionally it may cause uterine inertia if begun too early in the labour.

Ill-effects on Mother

There were no maternal deaths. No ill-effects on the respiratory rate were noted. No cases of bradycardia or arrhythmia were noted, but in three cases tachycardia was possibly connected with the administration of trichlorethylene.

Conclusion.—There was no definite evidence of any ill-effect on the mother from the administration of trichlorethylene.

Effect on the Foetus

Stillbirths.—There were 10 stillbirths among the 405 babies born, a rate of 24.7 per 1,000 total births. The stillbirth rate for the hospital is 27.4.

Neonatal Deaths.—There were 14 neonatal deaths, a rate of 35.4 per 1,000 live births. The neonatal death rate for the hospital is 36.6.

Incidence of Asphyxia.—Asphyxia was regarded as present if the baby did not cry within two minutes of birth or if it required resuscitation other than clearing of the air passages. Forty cases in which caesarean section, forceps, or other operative deliveries were carried out have been excluded, as other forms of anaesthesia were used. Using the above criteria, 28 babies showed evidence of asphyxia (7.8%).

Effect of Combination of Pethidine and Trichlorethylene in Production of Asphyxia.—Of the 28 cases of asphyxia 17 (60.7%) had pethidine in addition to trichlorethylene. In the whole series 57% had pethidine in addition to trichlorethylene. Thus it seems that, contrary to the Royal College of Obstetricians and Gynaecologists report, pethidine does not increase the incidence of asphyxia.

Premedication

A potassium bromide and chloral hydrate mixture was used in the early stages of labour followed by pethidine. By so doing, adequate analgesia was provided and the administration of trichlorethylene delayed until the cervix was dilated at least three fingerbreadths. The Royal College of Midwives allows these drugs to be administered by unsupervised midwives. No other drugs were used as premedication and no analgesic was given once the administration of trichlorethylene had begun.

Of the 228 patients who were given pethidine, 163 (71.5%) were in the "adequate analgesia" group and 65 (28.5%) in the "inadequate analgesia" group. Of the 172 patients who had trichlorethylene not preceded by pethidine, 127 (73.8%) were in the "adequate analgesia" group and 45 (26.2%) in the "inadequate analgesia" group. Pethidine can safely be combined with trichlorethylene, thereby shortening the duration of the administration of the latter, though it does not appear to improve the degree of analgesia obtained.

Conclusions

Trichlorethylene administered by the method described produces satisfactory analgesia, and it can safely be combined with pethidine without increasing the risk of foetal asphyxia. It does not increase the operative delivery rate or predispose to post-partum haemorrhage. It can safely be used by unsupervised midwives trained in the method of administration, with the following provisos: that administration is delayed until the cervix is dilated at least three fingerbreadths; that if the labour is not completed at the end of six hours the administration is stopped; and diminution in strength and frequency of the uterine contractions is an indication for discontinuing the administration.

I wish to thank the midwives for their co-operation and assistance in completing the forms.

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The St. John Ambulance Association has published a booklet designed to show older children the importance of personal hygiene and the hygienic handling of food. It is intended as the basis for the association's preliminary course on these subjects. The booklet, which has been written by Dr. Guy Bousfield, may be obtained from the association at St. John's Gate, London, E.C.1, price 1s. 6d. (by post 1s. 8d.).

Medical Memoranda

A Case of Primary Red-cell Aplasia

Primary aplastic anaemia is a rare condition occurring usually before the fourth decade. All the elements of the bone marrow are depressed, and the consequent symptoms of anaemia, with mouth infection and haemorrhage into skin and mucous membrane, have been long recognized. In recent years, however, it has been demonstrated that aplasia of bone marrow can occur which involves only the red-cell element. In view of the rarity of this condition it is of interest to record the following case.

CASE REPORT

A male infant aged 11 weeks was referred to hospital on July 3, 1950, because of extreme pallor. It was stated that the pregnancy and delivery had been normal, and that he had weighed 7 lb. (3.2 kg.) at birth. The mother declared that the child had been slightly yellow on the first day of life and had remained so for two or three days. Pallor had been noticed some weeks before admission, but it had grown steadily worse. There were two other children. The first had died of pneumonia at 7 months, and the mother stated that it also had been slightly yellow on the first and second days of life. The second baby was healthy and of normal colour. The mother and father were in normal health.

The baby, which weighed 10 lb. (4.5 kg.), was seen to be very pale. There was no icterus; neither liver nor spleen was palpable, and there were no other abnormal physical signs. A green stool was passed soon after admission, but subsequent stools were normal. Blood examination on July 3 showed: haemoglobin, 16%; red cells, 630,000; white cells, 5,850, with 41% polymorphs. The red blood cells showed macrocytosis, anisocytosis, and poikilocytosis. The blood was Group O, rhesus-positive. The mother's blood was Group B, rhesus-positive. Tibial marrow examination showed "moderate cellularity, red-cell precursors almost entirely absent, an occasional normoblast (less than 0.5%), and no gross abnormality of white cells. Apparently a pure red-cell aplasia." The blood W.R. and Kahn test were negative, and x-ray examination of the long bones revealed no abnormality.

Blood transfusions were given at intervals of three to five weeks. He was also given iron and folic acid by mouth, and liver by intramuscular injection, which proved ineffective. The baby has continued to develop well, and usually seems happy until the haemoglobin drops below 40%. At the time of writing he is 18 months old and in good health, having had no illness except mild diarrhoea once in the past three months. Further bone-marrow examinations confirmed the diagnosis.

COMMENT

Clinically this case was one of severe anaemia. There was no history of blood loss, and examination of the bone marrow showed that the essential defect was failure to produce red cells, and red cells only.

Prior to 1932 three cases of pure red-cell anaemia had been described (Kaznelson, 1922; Baar, 1928; Lupu and Nicolau, 1931). Since then, however, further cases have been put on record. Diamond and Blackfan (1938) described four cases, with recovery in one case after two years' treatment with blood transfusions. Numerous substances were given by mouth in the hope of stimulating erythropoiesis, but none were successful. Splenectomy, performed at 16 months, produced a remission in one case. They thought that aetiological factors involved were probably either congenital deficiency of red-cell element of the marrow or a defect in the metabolism of the blood.