probably had some connexion in this case on account of the small dose of the drug that was taken.

5. The pathological features are quite classical and are similar to those of other reported cases; they are of interest from the close resemblance to the condition met with in cases of trinitrotoluol poisoning.

6. The advisability of the abandonment, or at least better control, of the administration of cinchophen should be considered.

I should like to thank Dr. Buchanan for notes of the case prior to admission, Dr. Mackenzie for permission to record the case, and Dr. Anderson for notes on the post-mortem report and histological findings.

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THE ADVANTAGES OF NITROUS OXIDE AND AIR ANALGESIA IN THE MIDWIFERY OF GENERAL AND HOSPITAL PRACTICE

BY

JOHN ELAM, M.R.C.S., L.R.C.P.

The value of nitrous oxide and oxygen anaesthesia and analgesia in maternity has been recognized for some years, and yet because of certain technical difficulties this relief could never become available for all women in their confinements. But by making use of air instead of oxygen Dr. Minnitt of Liverpool has devised an apparatus which appears to fulfil all the necessary requirements.

The apparatus is an adaptation of a McKesson oxygen therapy apparatus.¹ Gas flows from the cylinder through a reducing valve into a bag contained in a metal drum. The flow of gas is controlled by an automatic valve so that it stops when the patient ceases to inhale.

A mixture of approximately 35 per cent. nitrous oxide in air is delivered to the patient. The method of administration is simply to turn on the gas, give the face-piece to the patient, and tell her to breathe in and out when a pain comes on, ceasing to make use of the apparatus when the pain goes away.

The Minnitt gas and air apparatus has been in use at the Wellhouse Hospital, Barnet, for the past eleven months, where I have been privileged to observe its use, and from personal observation of some 250 cases, both in this hospital and in private maternity work, I feel convinced that we have now come to the time when there can be no reasonable objection to all women enjoying the relief which gas and air can give.

Any method which is to be of general value for relieving the pain of maternity must fulfil certain requirements. These may be briefly enumerated as follows: (1) There must be satisfactory relief to the patient. (2) The normal process of labour must not be interfered with. (3) There must be no danger to mother or child. (4) The technique of administration must be one that can be used by midwives and nurses without constant medical supervision, and must be one which will assist the nurses in their work. (5) The apparatus must be readily portable, and not too expensive either to buy or to use. Let us now consider these requirements, and see how far they are fulfilled.

Relief from Pain in Normal Labour

The first 200 patients to receive gas and air at the Wellhouse Hospital were asked to give their own opinion of the method. Eighty-eight stated that they felt no pain whatsoever, 106 that they found great relief, and six that they found some relief. The almost complete silence that reigned in the ward while patients were having gas and air in the second stage of labour was most noticeable. This in itself was an eloquent testimony to the value of this form of analgesia.

In both hospital and private cases there was no evidence that labour was in any way prolonged. Patients being relieved of all, or much, of their pain were enabled to make great use of their voluntary muscles, thus helping delivery. Instead of an excited hysterical woman we found that we had a patient silent and contented, doing her utmost to assist. In 250 cases, some 60 per cent. of which were first confinements, there were nineteen forceps deliveries.

Safety of Mother and Child

Scientific work at Liverpool has shown that there is no danger to mother or child by the use of gas and air.^{2,3} Electrocardiograms for series of patients showed that they did not appear to be influenced to any significant extent as a result of their experiences. The alteration in the mother's pulse and the foetal heart rates estimated at approximately equal intervals during analgesia were within normal limits.

A biochemical study was made of the blood taken from a maternal vein and the umbilical cord in a number of patients immediately after delivery with and without analgesia, and conclusions were drawn that although the administration of gas and air reduced the oxygen content of the mother's blood that of the umbilical cord did not show any marked alteration. Clinically it was observed at the Wellhouse Hospital that with all five air ports of the machine open it was not possible to obtain full surgical anaesthesia in a normal healthy woman. Further, when the patient was breathing regularly in and out cyanosis did not occur, but when she held her breath and pushed down in the second stage of labour cyanosis did occur in a few cases, although this was not of a dangerous degree.

In the first 200 cases at this hospital there were four stillbirths; these were in no way due to the administration of the gas and air.

Is the Method a Help to the Nurse or Midwife?

We now come to a most important consideration, and one which, in my opinion, makes the gas and air technique of Dr. Minnitt superior to any other method.

At the Wellhouse Hospital for the first fifty cases a medical officer was present during the entire time gas and air was being administered. Gradually, however, as time went on and greater confidence was felt in the safety of the method the nurses took more charge, until it became evident that they were perfectly capable of managing a case on their own responsibility. The nursing staff now administers the gas and air to the patients after receiving instruction in its use, so that there is no need for the medical man or woman to be constantly present at the bedside of the patient.

According to the present rules of the Central Midwives Board there must be medical supervision when a nurse or midwife administers any form of anaesthesia or analgesia, but with gas and air the supervision can be very much reduced, thus assisting greatly in the administrative problems of a medical superintendent of a municipal hospital. Without this assistance it would be impossible for the general use of analgesia in labour in these hospitals.

The immense benefit of being able to leave the administration of the gas and air to a nurse is even more noticeable in general practice.

At the Wellhouse Hospital the sisters and nurses are enthusiastic supporters of the use of gas and air, since they find it helps them in their work and makes the patients more easy to manage. The superintending sister-midwife of Wellhouse Hospital states:

"(1) Unlike my experience with other anaesthetics gas and air rather tends to increase the contractions. (2) Even after long labours, there is no evidence of any harm to the child. (3) The patients are enthusiastic. (4) The patient is happier, less excitable, and more controllable. (5) I would prefer my patients to have gas and air in future. They can manage it quite well themselves after a little help and advice."

Expense

The cost of the complete machine fitted into a convenient carrying case is at present 17 guineas, but there does not appear to be any reason why this cost should not be very much reduced should the demand justify the manufacture of the apparatus on a large scale. It is readily portable, and the consumption of gas is about forty gallons an hour, intermittent flow. The actual cost in hospital practice has worked out at about 2s. per case. In private practice the cost is a little higher.

Comparison with Gas and Oxygen

Lastly it would be well to consider how gas and air compares with gas and oxygen for everyday midwifery.

1. The gas and oxygen apparatus at present on the market is rather expensive, and because one must carry oxygen cylinders as well as gas cylinders it is heavier to carry.

2. To administer gas and oxygen in maternity work with satisfactory results does require considerable experience and skill in anaesthetic technique. For the use of gas and air very little skill is required. The method is self administrative: the patient is given the face-piece and simply told to breathe in and out when a pain comes on. The only requirements are a well-fitting face-piece and a patient who will co-operate.

3. With gas and oxygen vomiting frequently occurs; with gas and air this vomiting is but rarely seen. Patients can, and do, take fluids freely during their confinements.

4. Excitement and cyanosis of the mother can readily occur when gas and oxygen is used, but these troubles are not found to any marked degree with gas and air. The absence of excitement is indeed an important and pronounced feature.

5. With gas and oxygen we can certainly guarantee absolute relief from pain in 100 per cent. of cases, but to do this we must again have a really expert anaesthetist. Our experience is that with gas and air we get 44 per cent. of patients who, without any premedication, have no pain whatsoever; 53 per cent. experience great relief; and 3 per cent. some relief. With premedication a much higher percentage of patients have no pain, and no expert anaesthetist is required.

The nursing staff at the Wellhouse Hospital has assisted us to its utmost to make the investigation a success, and the patients themselves have co-operated. Our sincere thanks are due to Mr. Rutherford, chairman of the Hertfordshire Public Assistance Committee, and to Lord Knutsford, a member of the Hertfordshire County Council, for their unflinching assistance and support.

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THE POST-OPERATIVE MANAGEMENT OF ACUTE EMPYEMA THORACIS*

BY

GEORGE A. MASON, M.B., B.S. DUNELM,
F.R.C.S.

HUNTERIAN PROFESSOR AT THE ROYAL COLLEGE OF SURGEONS OF ENGLAND; THORACIC SURGEON TO THE NORTHUMBERLAND COUNTY COUNCIL; SENIOR SURGICAL REGISTRAR, ROYAL VICTORIA INFIRMARY, NEWCASTLE-ON-TYNE

Acute empyema thoracis is a common disease, for which operations are frequently performed, yet the importance of careful post-operative care does not appear to be generally appreciated. Operation usually consists of some form of drainage, either open or closed. Blockage of, or ulceration around, the tube often necessitates the conversion of a closed drainage into an open one. The tube is less likely to become obstructed if all visible masses of lymph have been removed through a relatively wide thoracotomy incision when establishing drainage, provided that the condition of the patient permits. It is not intended to embark upon a discussion of the relative values of these operations—each having its own uses—but it is obvious that while open operation would be disastrous in certain cases, it is quite possible that some of the bad results attributed to this method may be partly due to faulty after-treatment.

General Treatment

The patient should be placed in the sitting position as soon as possible after returning to bed from the theatre. These cases are best nursed in the open air. Opiates may be given, if needed, during the early post-operative period to facilitate sleeping and to relieve pain. Fluids should be imbibed freely until the temperature has fallen to normal. Appetite returns as toxæmia diminishes, and full diet is permitted as soon as desired. Purgatives are administered as required. Massage should be given to the arms and legs to improve the general muscle tone, and the patient should be encouraged to move about the bed as much as possible. If the haemoglobin index is low, iron is beneficial. If the general condition has sufficiently improved, and the temperature has been normal for a fortnight, improvement is often accelerated by allowing the patient to get up.

Care of the Wound

Where a "closed" or, as I prefer to call it, a "siphon" system of drainage is used, the wound may be smeared with bipp and covered with a layer of sterilized dry dressing arranged round the tube fastened by adhesive strapping or elastoplast. Usually such a wound need not be disturbed for several days, the sutures being removed about the eighth or tenth day. The tube should be long enough to enable the patient to move about the bed without pulling it off or upsetting the bottle. Redundant coils of tubing are undesirable: lying on the floor, they are apt to become occupied with stagnant discharge.

It is advisable to have the drainage tube connected to a glass tube passing through the cork to the bottom of a bottle containing coloured antiseptic fluid (flavine), rather than to allow the rubber tube itself to be freely beneath the surface of the fluid. In the latter case the tube is only too often found gaily suspended above the level of the liquid. The attendants should, of course, be warned that the tube must be first clamped before it is

* Read in the Section of Surgery at the Annual Meeting of the British Medical Association, Bournemouth, 1934.