In a ward containing gas cases and other affections of the respiratory organs the former are kept on one side. When the percentage of gas patients is large the orderlies always suffer from irritation of the throat and cough. The other patients also cough more than they should for the same reason. It is therefore advisable, when possible, to isolate patients suffering from gas poisoning.

As regards results: Photophobia is either completely relieved or markedly diminished, so much so that patients coming on board unable to open their eyes are sometimes found, without their shades, looking at pictures and reading. The catarrh of the eyes still persists, but the pain is much relieved.

In throat cases the immediate result is the expectoration of a large quantity of purulent mucus. The dry cough becomes loose and the pain in the chest lessened. The soreness of the throat usually persists. The chief benefit obtained is relief from the distressing night cough. These patients generally have a good night's sleep, and the whole ward is, in consequence, quieter.

Chronic cases of two or three weeks are not materially relieved by the treatment. Our most successful cases are from three to six days old. The treatment is cheap and simple, and is suitable for all cases in transit from the clearing stations to their destination in England. Since we have them for so short a time on board ship, I cannot say whether it is curative, but from the relief obtained I believe that if these cases were treated continuously from the beginning the period of convalescence would be materially shortened.

THE ADMINISTRATION OF ANAESTHETICS TO SOLDIERS.

BY

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SINCE the beginning of the war I have had considerable experience in the administration of anaesthetics to soldiers in this country—in the first instance, to soldiers in a war hospital suffering from wounds and invalided home from the fronts, and latterly to young soldiers in full training admitted to a camp military hospital to undergo some operation. The two classes really differ considerably as regards type. The large majority of the former have been confined to bed for at least a few days, and are "invalids," and differ very little, as regards my subject, from the usual type of hospital patient in civil life. At the camp military hospital, on the other hand, we are constantly meeting with the young, athletic, well developed man of 18 to 21 years of age engaged in a period of intensive physical training. Frequently the operation is a trivial one, and admission to hospital the day previous to the operation is considered sufficient for the purposes of pre-operative preparation. The nervous system of the young soldier is by no means stable. He is frequently far more "nervous" than a woman. His reflexes are exquisitely sensitive. He is in hard muscular condition. He is nearly always a heavy cigarette smoker. We have thus many factors which go to make up a type difficult to anaesthetize safely and satisfactorily.

It must at once be laid down in the most emphatic manner that for such cases induction of anaesthesia with chloroform is strongly contraindicated. Should the attempt be made to anaesthetize with chloroform, it will be found that the large majority of these men develop excitement and struggling and spasm of the limbs and respiratory muscles. If at the moment of onset of such a state of spasm a strong chloroform vapour has been inhaled, it may be retained in the pulmonary alveoli for a considerable time, the percentage of chloroform in the circulating blood may be raised to a toxic degree, and fatal symptoms may appear while the corneae are still sensitive. The heart, indeed, gives way before breathing can be re-established.

It is exceedingly doubtful, too, whether a mixture of chloroform and ether is safer than pure chloroform during the induction period. The difference in degree of volatility of the two substances forms the difficulty. If any anaesthetic effect whatever is to be obtained from the ether element in the mixture, measures must be adopted to exclude the air to some extent, and exclusion of air is not

permissible if the chloroform element be present in any degree. Again, if the mixture be administered by anything resembling the constant drop method, or if the successive "doses" poured on the mask be too frequently repeated, we must remember that the proportion of chloroform in the vapour inhaled by the patient is rising to an unknown extent. My experience, indeed, goes to show that the result obtained by induction with a chloroform and ether mixture is the same as that obtained with pure chloroform.

Induction with pure ether, again, is attended in these cases with considerable difficulty. A large proportion of them have a certain degree of pharyngitis from excessive cigarette smoking, and coughing and choking are common phenomena.

Nitrous oxide gas produces too light and evanescent an anaesthesia in these robust subjects to form a satisfactory prelude to ether, and any attempt to prolong it by administering more gas results in undesirable cyanosis.

I have come to the conclusion, therefore, that an ethyl chloride-ether sequence is the best method we can adopt for induction, and have devised a method of using this sequence which I should like to bring to the notice of others.

I do not think that the majority of administrators use ethyl chloride in the most satisfactory manner. Although we quite realize that it is not quantity of anaesthetic used, but strength of vapour inhaled, that is the determining factor in producing anaesthesia, I find that in books on the subject, such as Hewitt's and Buxton's, this principle is fully realized when discussing chloroform or ether, but it is thrown aside when treating upon ethyl chloride. We are told, for example, to give so many cubic centimetres to a child and so many to an adult. This method would be all right so far if we could be sure that the quantity of ethyl chloride prescribed could always be vaporized in a desired and known quantity of air. We cannot be sure of this. Again, it is impressed upon us in administering chloroform and ether that the patient should be *gradually* put under with a steadily increasing strength of vapour. With the recognized methods of giving ethyl chloride, on the other hand, there is nothing to prevent the patient getting the full strength of the vapour with his first inhalation, a really dreadful experience for the patient, and associated with considerable danger. For the past five or six years I have constantly used an inhaler for ethyl chloride devised by Mr. C. J. Loosley, anaesthetist, Hospital for Children, Great Ormond Street, and have given many hundreds of administrations, including about 300 to soldiers (early in the war) undergoing dental extractions. To have a stopcock fitted to the foot of the bag and this connected by rubber tubing with an ether bottle and bellows was an easy matter, and this forms the simple apparatus which I now use in giving the ethyl chloride-ether vapour sequence.

To indicate briefly how the apparatus is used, and quoting freely from Mr. Loosley's description of his inhaler, about 3 c.cm. of ethyl chloride are sprayed into the bag through the valve *v*. This valve opens when the nozzle of the ethyl chloride tube is pressed against it, and closes automatically immediately the nozzle is withdrawn, a tube below carrying the discharge well away from the face-piece. The face-piece is applied to the patient's face and the lever of the two-way cock *L* kept in the down position so that the first few breaths of the patient are turned into the bag till it is about half full. The lever *L* is now pulled upwards towards the face-piece and the patient breathes a dilute mixture of ethyl chloride vapour and air. Dilute ethyl chloride vapour is quite pleasant to breathe. A vapour sufficiently strong to produce anaesthesia is pungent and produces a sense of suffocation. The vapour is now strengthened by spraying a little more ethyl chloride through the valve, and still a little more until anaesthesia is produced. The patient is now, as a rule,

breathing vigorously, but there is abundance of air in the bag and he can take a full breath without emptying it.

Using ethyl chloride alone we can safely push the anaesthetic till we have the usual signs—fixed eyeballs, dilated pupils, and insensitive corneae—before removing the face-piece, and a good minute and a half or more of satisfactory anaesthesia without trace of cyanosis will be obtained. Using it in sequence with ether a profound ethyl chloride effect is not desirable, and as soon as unconsciousness is produced ether vapour may be pumped into the bag by means of the hand bellows. The strength of ether vapour can be varied within any limits by varying the degree of vigour of pumping and by the admission of more or less air at the face-piece. The apparatus is very economical as regards amount of ether used, a certain amount of rebreathing being involved, and, if desired, a much stronger vapour can be obtained than by using a Clover.

I contend that the method is a safe and highly satisfactory one for the induction of anaesthesia, especially for the difficult type of patient under consideration, and it is also a satisfactory apparatus to use in maintaining anaesthesia in the large majority of operations in a camp hospital.

I think that most administrators will agree that quick inductions and closed inhalers tend to be associated with vigorous respiratory movements. In abdominal cases I therefore prefer a slow induction with chloroform and an open mask, changing to ether and an ether mask and the drop method before the dangerous period of excitement supervenes. Fortunately abdominal cases rarely come to operation while yet in a state of youthful vigour, and thus do not present the difficulties I have been discussing. In conclusion, I am convinced that the previous hypodermic administration of $\frac{1}{4}$ gr. morphine and $\frac{1}{100}$ gr. atropine is of considerable value. The hypodermic should be given no matter how trivial the operation may be.

Occasionally the nature of the operation demands the use of chloroform, but after the induction period is over and full narcosis has been produced these young soldiers take chloroform well.

Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

AN APPARATUS TO FACILITATE THOMAS'S SUCTION TREATMENT.

MEMBERS of the profession who use dry cupping as recommended by Hugh Owen Thomas (of Thomas's splint fame), whose ideas have been appropriated and elaborated by the German Dr. Biers (a name we have too long permitted to eclipse that of the originator of the method), may be glad to hear of an apparatus I have invented that not only greatly reduces the physical work entailed in working an air pump in the usual way with both hands, but frees one hand, which can be employed in adjusting the cup to the part operated on.

As seen by the illustration, the apparatus consists of a wheel, A, 18 in. in diameter, moving in a vertical plane with

a crank axle that moves a vertical rod, B, up and down. The latter moves the lever C, which rotates on the pivot D. The piston E of the air pump F (which is fixed rigidly in the clamp G) is attached to the end of the lever C, and is moved up and down by the latter. The wheel is kept in motion by the hand at handle H. A pedal can easily be fixed and the movement maintained by that means. A cup, I, is attached by stout indiarubber tubing to the nozzle

of the air pump. The apparatus (without the pump) may be obtained from Mr. T. Pottinger, Markham Road, Winton, Bournemouth.

Thomas's method used in this powerful way has been found to be of the utmost use in relieving pain due to locally inflamed areas, lumbago, sciatic pain, spinal irritation. Its use is suggested in a great number of ailments, amongst others, those in which the stage for surgical depletion has not been reached.

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WHOOPIING-COUGH AND LYMPHAEMIA.

MANY observers have established the fact that in whooping-cough during the convulsive stage a considerable lymphocytosis is practically constant. Dr. Gordon Ward (*Clinical Haematology*, p. 53) states that he has "seen lymphæmia follow an attack of whooping-cough, but there is little evidence to suggest that this was more than a coincidence." It seems to me the following cases suggest that it may have been more than a coincidence.

CASE I.

A healthy boy, $3\frac{1}{2}$ years old, had whooping-cough for about a week. Examination of films showed 75 per cent. of lymphocytes, 5 of mononuclears, 1.5 of eosinophils, and 18.5 of polymorphs. General survey of a film revealed considerable increase of white cells. (No total count was made, but a few days later this was 26,600.)

The lymphoid cells were abnormal in four respects: (1) There was a considerable proportion of small forms which were naked nuclei, and some of these were even deformed and dwarf. (2) Cells otherwise like small lymphocytes showed hour-glass, deeply incised, and elongated, bent and twisted nuclei (Rieder forms). (3) A few showed distinctly divided nucleus—twin nuclei. (4) Of the total whites, 2 per cent. were in plasma cell form.

CASE II.

A fairly healthy girl, aged 2 $\frac{1}{2}$ months, had moderate whooping-cough for a month. The film had 65 per cent. of lymphocytes, 12 of mononuclears, 1 of eosinophils, and 22 of polymorphs. In the films were seen several lymphocytes and mononuclears and a few large lymphoid cells, each with two nuclei. A general survey revealed a few polychromatic reds but did not suggest great increase of whites.

A week later films were taken, and in counting 200 whites there were seen four mononuclears with twin nuclei. In the same film was seen one in which the nucleus had divided into two equal parts, and then one of these apparently had also divided into two. A large lymphoid cell with a fair envelope of hyaline cytoplasm showed two distinct well stained oval nuclei. The differential count gave 45 per cent. of lymphocytes, 27.5 of mononuclears, 1 of eosinophils, 26 of polymorphs, and 0.5 of myelocytes.

These are not the only cases in which I have seen similar forms.

The points of difference from an established lymphæmia are obvious, but in an early stage of lymphæmia we know little about the blood. We do know, however, that in acute lymphæmia the white count need not exceed 20,000. Pappenheim has said (*Clinical Examination of the Blood*, 1914, p. 36): "There is this further point of difference, never observed in the leucocytoses, that various atypical forms of cell are met with. Further, mitoses are frequently observed in the leukaemias, but never in the leucocytoses. Above all, in addition to amitotic cell division occurring in lymphatic leukaemias, the Rieder type of lymphocyte may be seen." And Dr. Gordon Ward (op. cit., p. 63) writes: "If a cell other than a nucleated red is found in any film to be undergoing mitosis there can be no doubt that a case of leukaemia is being dealt with."

My cases prove that neither mitoses nor atypical cells (naked, dwarf, deformed, plasma cell, Rieder forms), and not even a liberal combination of both, are incompatible with simple lymphocytosis. But my point is that, with 80 per cent. of lymphoid cells and plenty of atypical and mitosing cells, whooping-cough lymphocytosis comes near what is defined as lymphæmic blood; that in such cases the white cell count may exceed 200,000 (Gulland and Goodall, *The Blood*, 1914, p. 280), a count probably unknown except in leukaemia; and, finally, that a haematologist "has seen lymphæmia follow an attack of whooping-cough."

Perhaps I ought to add that Pappenheim (op. cit., p. 26) believes that "since they (plasma cells) make their appearance in the course of a leukaemic leucocytosis, it would seem to suggest an inflammatory cause for the leukaemias in question."

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