

required to produce any desired result. Salt, on the other hand, may be considered an antidote against bromidism and should be so employed. Epileptic attacks can sometimes be produced by large doses of salt in cases otherwise controlled by bromids.

LIMITATIONS OF SALT RESTRICTION

So simple a measure as the regulation of the table salt intake may assume, therefore, the dignity of a fundamentally important therapeutic inroad. Again empiricism has pointed the way and full scientific explanation must come a little later. In view of the occasionally brilliant results that have been obtained; in view of the apparently simple (and correspondingly incomplete and inaccurate) explanations that have been offered, enthusiasm has gone somewhat beyond bounds in regard to salt restriction as a therapeutic measure. It is by no means a panacea for all nephritic edemas. With careful selection of types and with methodic regulation and control, salt restriction can probably never do harm and will usually do good; but employed as a routine measure without control, promiscuously, in every case of edema, it will more often disappoint than fulfil the expectations based on it.

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UP-TO-DATE METHODS OF ANESTHESIA*

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Modernizing an old house is a much more difficult procedure than building a new one. Similarly, it is more difficult to correct misinformation than to inculcate sound principles from the beginning. The more difficult task, however, is before me.

THE AMPHITHEATER

It may not be going too far afield to say that an up-to-date anesthesia should be given in an up-to-date amphitheater. This gives me an opportunity to air certain phases of the life of a surgeon and anesthetist and incidentally the life of each patient that comes under their care. I refer now to the poorly ventilated operating-rooms existing in the most modern hospitals. In not a single operating-room that I know of is the air changed and rendered livable. The air should be forced in near the ceiling through gauze and should be drawn off near the floor, in this way giving a constant supply of fresh air and, of course, at the same temperature. An electric fan merely sets in motion the impure air in the room and does not purify it. In addition to having the walls and ceiling wiped down with a weak bichlorid solution, the floor, regardless of its composition, should always be cleaned with oiled sawdust, or something having a weak solution of oil in it so that any particles of dust dropped by the surgeons, assistants and nurses from their clothes and shoes will remain under foot.

THE PSYCHIC ELEMENT

Crile,¹ in a recent paper, has attempted to show that there is a physical basis existing in the brain that accounts for the element of fear in some patients as regards the operation, and that therefore preliminary

medication is an absolute essential of every up-to-date anesthesia. I have long been the advocate of modified physiologic doses of morphin, chlorotone or other drugs to allay fear and prevent the psychic element from being in evidence in the slightest degree. The patients take the anesthetic more kindly and require less of it, and do not demand immediate attention after the operation, being in a quiet state and suffering neither mental anxiety nor physical pain. On the other hand, some of the best-known surgeons in the United States absolutely ignore the fact that such a thing as fear exists, not realizing the responsibility of such a position.

OBJECTIONS TO THE USE OF MORPHIN

Bevan² agrees with his anesthetist, Dr. Isabella Herb,³ that "drugging," as they term giving small physiologic doses of morphin, "is objectionable in that it delays reflex excitability of the air-passages, retards coughing, favors the retention of aspirated blood or vomitus in the trachea." Bevan also states that "many people are not able to take morphin without distress and with such individuals the disagreeable after-effects of ether would be aggravating" . . . : that "it masks the most valuable guide in anesthesia, the pupillary reaction." As morphin is given as a routine thing in suitable doses by men who use spinal, local and rectal anesthesia, and by all who use nitrous oxid and oxygen anesthesia, the objections, as stated by Bevan and his anesthetist, could apply only to the two pulmonary anesthetics, ether and chloroform, and possibly ethyl chlorid.

The eye is never touched or looked at under nitrous oxid and oxygen anesthesia and a great majority of anesthetists to-day rely on the respiration and the maintenance of an open air-way as the principal guides. In addition to these we have the pulse, color and lid reflex, rarely observing the pupil, much less relying on it. It is hardly fair for Bevan and his anesthetist to ask us to relinquish the use of morphin on account of the pupil.

Another reason which they give for refusing to use this drug is, in my opinion, the strongest argument for the use of it, as illustrated by the well-known therapeutic fact that "one drug will augment the action of another." An overdose of the anesthetic is not more possible with morphin than without it by one who knows what he is doing. Bevan asserts: "In case of any untoward accident there is not only the volatile and quickly removable drug but also the non-volatile and comparatively permanent one to be eliminated." Again this is a sound argument in favor of using morphin as a preliminary. The volatile and quickly removable drug is gradually withdrawn toward the close of every operation, leaving the patient in a quiet, pain-free state. The small physiologic dose that we prescribe helps to prevent shock, but never masks it entirely. When this occurs in an operation the anesthetist eases up on the volatile anesthetic, and the patient is in better fighting attitude to resist the shock than if he were wholly under ether or chloroform.

The other objections of Bevan, in regard to retarding cough and favoring the retention of aspirated blood and vomitus in the trachea, etc., taken with other parts of his article, are sufficient internal evidence that his mind still lingers in an age that should be past as regards anesthetics. Dr. Isabella Herb's article³ has an illustration of a strap which is used in insane asylums for

* Read before the Practitioners Club of Jersey City, Dec. 12, 1911.

1. Crile, George W.: Newer Methods for Further Increasing the Safety of Surgical Operations, *THE JOURNAL A. M. A.*, Dec. 2, 1911, p. 1811.

2. Bevan, Arthur Dean: The Choice of the Anesthetic, *THE JOURNAL A. M. A.*, Dec. 2, 1911, p. 1821.

3. Herb, Isabella C.: Administration of General Anesthetics with Special Reference to Ether and Chloroform, *THE JOURNAL A. M. A.*, May 6, 1911, p. 1312.

restraining patients, also directions for cleansing the mouth of mucus, saliva, etc. The question is: Shall we use straps and, in a great number of cases, have the mucous r le in the throat of the patient during the operation and also the nausea afterward that always accompanies the mucous r le and in addition the mental suffering, or shall we have the patient come in a neutral state and take the anesthetic quietly, and during the operation not have the mucous r le and finally come out without nausea or vomiting at the end of the operation?

Collins⁴ published the report of a series of over 1,000 cases in which he used morphin and scopolamin (hyoscine). The patients not only took the anesthetic quietly and easily, but in over 90 per cent. there was no nausea or distress following the operation.

The question immediately arises here, Shall we, like the devoted followers of popular cults, follow the teachings of our great surgeons blindly, or shall we separate the wheat from the chaff, the gold from the dross, analyzing and weighing every proposition, thus arriving at a correct conclusion?

ANESTHETICS

The Reason for Giving Preliminary Medication.—The principal objection to withholding preliminary medication from the patient about to undergo an operation is the mental suffering undergone at this time if the patient is not so treated. This may eventually come back to him at some future date and possibly prevent him from undergoing a necessary operation until the time limit has expired and nothing but palliative surgery is possible. All patients, except possibly those under 8 and over 80, or those in a state of coma, should have preliminary medication. As Collins says, it is much easier to anesthetize a patient half asleep than one with all reflexes in rebellion.

The Administration.—With our patient suitably prepared, we are now ready to administer the anesthetic. If we are to do this scientifically, while we should presumably have a general idea of what we are going to give, we should always be prepared to change or modify our anesthetic as the exigencies of the case demand. The objection to adhering strictly to some one anesthetic or method of administration is that it handicaps the anesthetist and places the patient at a disadvantage at once.

The First Death Under Nitrous Oxid and Oxygen.—This is strikingly illustrated by the first reported death under nitrous oxid and oxygen. Dr. Lydston,⁵ of Chicago, reported this death with all attending circumstances and surroundings. Nitrous oxid and oxygen had been determined on as the anesthetic suitable for this special case. In less than ten minutes from the time the mask was applied the patient was dead. From the way the case was reported the anesthetist must have known in less than three minutes that this was an unsuitable case for nitrous oxid and oxygen and should have been prepared to switch. Numbers of deaths that have never been reported have occurred under nitrous oxid and oxygen anesthesia.

Nitrous Oxid and Oxygen Anesthesia.—This is not the innocuous anesthesia that manufacturers of gas and apparatus, and enthusiasts like Crile and Gatch, would have us to believe. One death occurred in Crile's clinic which, he says, he felt would not occur at the present time. Dr. Teter⁶ reports a death which he does not think attributable to the anesthetic; two deaths are

reported by Gatch,⁷ at Johns Hopkins Hospital, neither of these attributable to the anesthetic and yet one of these patients had been successfully anesthetized a short period previously with ether. Crile, in his last article, wipes the one preventable death from his memory and states that no deaths have occurred in his clinic from nitrous oxid and oxygen anesthesia. I know of one professional anesthetist who had narcotized thousands of patients with ether and chloroform without a single death for a period extending over ten years, and less than one year after his taking up nitrous oxid and oxygen two deaths occurred in his professional family, presumably through no fault of the anesthetic or the anesthetist. Thus are statistics made. Far be it for me to deery the value or the increasing use of nitrous oxid and oxygen, but if we are to give an up-to-date anesthetic, should the patient show symptoms that his life is in constant danger from this method of anesthesia, we should give him the immediate benefit of some other method and some other anesthetic.

The Safest Time to Change to Nitrous Oxid.—The safest and best time during the course of an anesthesia to administer nitrous oxid and oxygen is at the close of the narcosis. It is an easy matter to follow up an ether administration with nitrous oxid and oxygen. The tissues of the human body are in such a condition at the close of an operation lasting one hour or more that if any untoward effects are to occur from the use of chloroform or ether they are apt to occur after this, and here is where nitrous oxid and oxygen should be introduced so quietly and carefully that the surgeon will not be aware of the substitution.

Nitrous Oxid-Ether Sequence.—The nitrous oxid-ether sequence is used supposedly in many hospitals to-day. These are a few rules by which the surgeon will know whether or not the nitrous oxid-ether sequence has been used:

1. The patient should be under the gas in less than two minutes.
2. When the ether is given there should be no struggling or hesitancy in any way as the change is made. If the stage of excitement is present in any degree whatever, faulty technic is somewhere responsible. When struggling occurs, what really happens is that the patient is given one or two bags of gas; but air is admitted at the same time through a faulty inhaler or between the inhaler and the face. The ether is now turned on with the consequent result that a tremendous flow of saliva is occasioned, which handicaps the anesthetist throughout the operation. The idea of the nitrous oxid-ether sequence is to prevent the second stage of excitement and the flow of saliva. In addition, it allows a reduction of the amount of ether used, and modifies the nausea and vomiting. If any of these things occur, the patient has not had the full benefit of the sequence. If the patient takes the nitrous oxid or nitrous oxid and oxygen quietly and easily, there is no reason why this should not be continued. If a greater degree of relaxation is required there is no good reason why a switch should not be made to ether, and then, if necessary, to chloroform.

Comparative Safety of Ether and Chloroform, and Nitrous Oxid and Oxygen.—As a broad general proposition, I wish to state that properly administered, an ether or chloroform anesthesia is as safe and also as free from after-effects as is a nitrous oxid and oxygen anesthesia.

4. Collins, C. U.: THE JOURNAL A. M. A., March 20, 1910, p. 1051.

5. Lydston: Med. Rec., Nov. 12, 1910, and Feb. 11, 1911.

6. Teter, Charles K.: THE JOURNAL A. M. A., Aug. 7, 1909, p. 448.

7. Gatch, W. D.: The Use of Rebreathing in the Administration of Anesthetics. THE JOURNAL A. M. A., Nov. 11, 1911, p. 1593.

METHODS OF ADMINISTRATION

The question arises: In what form shall we administer the anesthetic, by the cone, drop or vapor method? The cone method is acknowledged by all to be the worst possible anesthetic for the patient and yet this is still used in many hospitals.

The Drop Method.—The drop method has been strongly advocated by the Mayo brothers,* Murphy,⁸ Bevan and other leading men. The article of Dr. Isabella Herb presents sufficient internal evidence for the discarding of this method. I use the drop method daily at some time during the anesthesia, but *not constantly*.

The Vapor Method.—The vapor with the warm attenuated moist air is so far superior to the drop method that it cannot be compared with it. The only anesthetic to which the vapor can be compared is the nitrous oxid and oxygen combination. I feel that the vapor method is so much safer than the nitrous oxid and oxygen that if I were to be anesthetized myself I would not hesitate to choose the vapor in preference to the other combination.

DUTIES OF THE ANESTHETIST

The anesthetist should have entire charge of the preliminary medication, as also of the medication during and after the operation, i. e., as far as it relates to the anesthetic. At the close of every operation the patient should have from 1 to 2 pints of warm saline with 1 ounce of glucose per rectum, to restore the glycogenic function of the liver and to relieve the thirst and fill out the veins; as the operation is closing or a little later, an enema of 3 to 6 ounces of warm olive oil should be given in order to restore the opsonic index.¹⁰ With these precautions and additions not one patient in ten will have any nausea or vomiting, or any unpleasant recollections of the work of the surgeon and his assistants.

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TACKS AND NAILS IN THE AIR-PASSAGES: BRONCHOSCOPY *

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From among a number of my unreported cases of bronchoscopy for foreign bodies in the air-passages, I have selected for consideration the histories of three, each of which possesses some features of unusual interest.

CASE 1.—A boy of about 14, whom I saw in 1910, was suspected of having drawn a tack into his air-passage eight weeks before he was brought to me. The mother informed me that the delay in seeking relief was due to the boy's precocious fear of death, which he thought might result from an operation. The history showed that this patient had suffered from hacking cough and almost daily fever since shortly after the accident, the temperature varying from 99.5 to 104.5 F., but there was no dyspnea and he complained of no pain. He had had a convulsion two days before I saw him, but the history gave no statement as to whether or not he had ever had any others.

Examination.—The temperature was running high every day, the respirations about 30, pulse varying from 102 to 132. The appetite was fair, bowels and urine normal. The hacking cough was attended by expectoration of a small quantity of

tenacious mucus. Signs in nose and throat were negative. Liver and spleen were normal. Chest normal in form but some loss of movement on the right side. Heart's apex in natural position and giving normal sounds excepting slight systolic murmur, confined to apex. Physical signs over left lung normal. Over the right side, especially the lower part, the vocal fremitus was very weak. The vocal resonance was normal above the sixth rib but very much diminished below that. In front the pulmonary resonance was normal as low as the sixth rib when he was sitting, but only to the fifth when he was lying down. Immediately below these lines great dullness was found for $\frac{3}{4}$ inch, and flatness below that. This suggested that the pleural cavity was filled with fluid up to these lines; but it should be noted that the line of flatness was lower when he was sitting than when he was lying down; just the reverse of what should have occurred from the presence of fluid. Posteriorly, the line of flatness was found at the seventh interspace but it did not change when he lay on the left side. An occasional r le could be heard over the upper part of the right lung; but below the line of flatness there were neither r les, vesicular murmur nor bronchial breathing. The physical signs over the lower half of the right lung thus spoke first for pleuritic effusion, but the normal position of the apex of the heart and the raising of the line of flatness by placing the patient on his back, and the fact that this line did not change posteriorly or laterally when he was placed on the opposite side, was against this conclusion and indicated either extensive pleural adhesions or complete filling up of the air-passage in this portion of the lung, due to pulmonary collapse, extensive pneumonic consolidation or to secretions in the bronchi and air vesicles, or to these combined.

Operation.—A radiograph was taken which showed the shadow of an upholsterer's tack well down in the right main bronchus, with the point upward. After removal this tack measured 1.9 cm. in length and its brass head measured 9 mm. in diameter. Notwithstanding the high temperature, an operation appeared the only means of relief; therefore, he was given ether and a bronchoscope introduced. I found the right bronchus filled with granulations which had to be removed before I could get sight of the tack. The moment this tissue was disturbed bleeding occurred which obscured the field of vision and caused great delay from the necessity of swabbing away the blood. This is one of the greatest difficulties when granulomas are encountered in these cases, and one which occupies at least nine-tenths of the operator's time; for when the bleeding has been checked and the field of vision once more cleared, the next portion of the granulation tissue that is removed causes a repetition of the whole procedure; and this is likely to occur repeatedly before the foreign body can be seen, as it did in this case. After prolonged effort with numerous delays from the blood, occupying about an hour's time, I brought the tack into view and grasped it with a Killian forceps that had a very good grip. I withdrew it slowly, as the head was so large that it stuck quite firmly in the bronchus and even in the trachea. It was altogether too large to be drawn into the bronchoscope, which had to be withdrawn at the same time. When the tack was in the vicinity of the glottis, it slipped from the forceps and I searched for it again for half an hour, this time greatly hindered by the escape of large quantities of pus which had been set free by the displacement of the head of the tack which had acted as a perfect stopper. Finally, having had the patient an hour and a half under the anesthetic and discouraged from not again being able to see the tack, I slowly withdrew the bronchoscope and immediately afterward found the tack in the patient's mouth.

In another case of the same kind of foreign body, I had a similar experience with slipping of the forceps, prolonged search for the tack and finally as the bronchoscope was withdrawn it fell out on the floor. I cannot yet guess where these tacks were hidden previously.

I had this patient under the ether with the bronchoscope in the trachea for an hour and a half, which is, I think, much too long; but every minute I had hoped

⁸ Magaw, Alice: A Review of Over Fourteen Thousand Surgical Anesthetics, Surg., Gynec. and Obstet., December, 1906, p. 795.
⁹ Murphy, John B.: Practical Medical Series, 1911, xl, p. 33.
¹⁰ Ferguson, Robert H.: The Opsonic Index in Relation to Surgical Anesthesia, E. H. Snodgrass and Son.
* Read before the South Side Branch of the Chicago Medical Society, December, 1911.