state of tetanic contraction, but in all these the bowel was involved only for a few inches. Sometimes the contracted area, on being bathed with hot saline solution, was seen to relax and assume a normal appearance. No such observation was permissible in the above case, the manipulations having produced a marked degree of shock.

In regard to the action of belladonna as an antispasmodic, the patient, who was anaesthetized with ethyl chloride followed by open ether, had received one hour prior to operation a hypodermic injection of atropine $\frac{1}{2}$ grain. Enterospasm may simulate almost any intra-abdominal lesion, either chronic or acute, and is one explanation of cases which appear to be some variety of the "acute abdomen" but in which operation shows nothing abnormal, the surgeon not always being so fortunate as to catch the intestine in a state of spasm.

James Swain² has recorded a case resembling acute obstruction in which only spastic intestine was found; also a case resembling perforation of a gastric ulcer in which operation showed no cause for the symptoms. This last patient had previously undergone gastro-enterostomy, nephropexy, and removal of the appendix. In cases resembling an infective lesion the absence of an increase in the number of the leucocytes is a useful aid to diagnosis.

Mimicry by enterospasm of chronic abdominal affections is not uncommon. I have another patient, a medical man, aged 49, who has for ten years suffered from attacks of abdominal discomfort, sometimes aggravated into acute pain. He is mildly neurasthenic, and the attacks follow periods of excessive work or undue worry. They have at different times suggested chronic cholecystitis and a colonic growth, but nothing definite has ever been demonstrable, and the patient not unnaturally declines operation. In this case the spasm sometimes involves the rectum and perineum, the patient being awakened in the early hours of the morning by an intense sacro-rectal pain, which is relieved by firm pressure made on the perineum, and terminates with expulsion of flatus.

Among Hawkins's observations are the following:

There is much abdominal pain which has no name and does not kill.

Such patients may be intelligent and industrious, but they are none the less emotional. They are neurasthenic in the sense that the nervous power is rapidly exhausted by exertion of body or mind, and is but slowly restored.

The abdominal trouble varies directly with the mental state.

In nearly all of these cases some part of the colon can be felt as a hard cord about the size of a man's forefinger. This is more common in the left iliac fossa than elsewhere.

But it is well to remember that in patients with no symptoms of enterospasm it is usually easy, provided they are thin; to palpate the iliac colon as a rounded cord. Enterospasm frequently simulates chronic appendicitis, and Hawkins, after quoting eleven cases in which removal of the appendix caused no improvement, says:

It would be a gain if only it were generally allowed that not all pain in the right side is due to disease of the appendix, but may have such a comparatively harmless nature as is here suggested.

He concludes:

There is no disguising the fact that patients exist whose intelligence is of such an order that, if suspicion has once been cast upon the state of their appendix, they will not rest satisfied until it is excised. Finally, in cases in which the pain is probably of the functional kind and yet the possibility of appendix disease cannot be excluded, it is certainly helpful to the physician if the appendix has already been removed. On carrying out his course of treatment, he can then act more freely than if a doubtful appendix were still present.

Tissues which are diseased frequently need removal, but that asthenia, whether it be of the patient's intellect or of the physician's efforts, should be treated by ablation of organs not obviously abnormal, is a proposition which I am unable to accept.

REFERENCES.

¹ BRITISH MEDICAL JOURNAL, January 13th, 1906, p. 65. ² Ibid., June 22nd, 1912, p. 1412.

THE University of Lausanne recently celebrated the twenty-fifth anniversary of its foundation. Among those upon whom honorary degrees were conferred on the occasion was Dr. Rollier, who has taken a leading part in the introduction of the sun cure for tuberculous diseases of bone in Switzerland.

PRACTICAL METHODS OF ANAESTHESIA.*

BY

JAMES T. GWATHMEY, M.D.,

NEW YORK CITY.

THE word "practical" in this paper means:

1. That the anaesthetic should be suited to the patient, to be modified or changed entirely if indicated.

2. That the induction should be pleasant to the patient, respiration, blood pressure, and colour reflex remaining normal.

3. That the maintenance of anaesthesia should vary with the requirements of the surgeon, at the same time keeping the patient's condition as nearly normal as possible.

4. That the transition from the anaesthetic stage should be as gradual and smooth as the induction, the patient emerging as from a quiet sleep, without pain, nausea, or conscious or unconscious vomiting.

All of these requirements are met by modern methods, not yet in general use by the excessively utilitarian surgeon who employs one method, administered by a nurse anaesthetist. Anaesthesia is a vital part of the practice of medicine. The adoption of any one method, and hence of any one anaesthetic, regardless of conditions, is contrary to the common sense that should govern all surgical procedures and the administration of all drugs. When a surgeon assumes the responsibility for the narcosis he becomes an anaesthetist. It is almost impossible for him to keep up with the literature of his own speciality; that he is not up to date on the subject of anaesthesia is proved by the type of anaesthesia witnessed in some of the best known clinics of to-day.

It is begging the question to say that the nurse anaesthetist is superior to the average interne. On the other hand, the professional anaesthetist must modify his point of view. A physician specializing in anaesthesia should have control of this department in every large hospital, in every medical college, and in every large teaching clinic. It is inexcusable to place nurses in absolute charge of anaesthesia in large teaching clinics.

The nurse anaesthetist has proved to be entirely "practical," according to some surgeons; but it is proposed to discuss the subject under the higher meaning of the word "practical," as briefly as possible.

Preliminary and Post operative Medication.

In order to forestall acidosis, the patient should be given sodium bicarbonate and lactose, one drachm of each, every four hours for at least forty-eight hours before the operation. If the urine is already acid the dose of sodium should be increased. Glucose, by the rectum, should be given after the operation (Buckler). Bonnot and Cleveland, of St. Louis, after using quinine salts in 600 cases, recommended quinine muriate, grains 10, dissolved in 2 ounces of water at 100° F., to be given immediately after operation, and to be followed in thirty minutes by saline proctoclysis, or in septic cases by six ounces of olive oil. The quinine is repeated every six hours for from four to six doses. It is stated that with this medication "back-ache is practically eliminated, and only about 2 per cent. suffer gas pains."

Preliminary narcotic medication is indicated in nearly every case. It should vary with the patient and with the individual anaesthetist. Without such preparation, a rise of blood pressure at the very thought of the operation, together with other changes from the normal, may prevent the smooth induction, the easy maintenance, and the uneventful recovery that would otherwise be obtained.

Instead of morphine, which sometimes in itself produces nausea, we prefer the following preliminary, which is modified to suit the individual case:

R

Paraldehyde }
Pot. bromid. } aa 3i-ij
Aqueae q.s. ad ʒiv

M. Sig.: With the patient in Sims's position give, per rectum, 40 to 90 minutes before operation.

It has been proved, in the laboratory, that with this medication: (1) Anaesthesia comes on more promptly and

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less ether is required; (2) the margin of safety is increased, thus making anaesthesia a safer procedure.

This medication may possibly have the same effect as Crile seems to have found with morphine—that is, a regulator of acidosis. In fact, Crile recommends bromides by the rectum for this purpose. Codeine also may be used instead of morphine.

Anaesthetic Agents.

While morphine has long since been discarded as a general anaesthetic, it is well to bear in mind, in railway emergency work, that a patient is safer with morphine and alcohol than with either drug alone. Also, that with this combination an analgesic stage comes on before unconsciousness, just as, in the amputation of a limb, a tourniquet completes the analgesia long before the alcohol sleep commences.

Chloroform, anethol, and ethyl chloride are rarely used in this climate as the terminal anaesthetic; as the initiatory agent, however, or to supplement other anaesthetics, they are most useful.

The essence of orange (composed of 25 per cent. oil of bitter orange peel and 75 per cent. absolute alcohol) is not in itself an anaesthetic, but the fact that its odour is ten times as penetrating as that of ether vapour makes it a safer and better introductory agent to ether by the closed method than nitrous oxide. The physiological basis for the beneficial effect of the oil of orange in the administration of inhalation anaesthetics may be found in its prevention of reflex stimulation, by the anaesthetic, of certain sensory nerves.

Dastré¹ attributed early syncope to reflex stimulation of the pneumogastric and trigeminal nerves, particularly the sensory branches supplying the nasal mucous membrane and the larynx. Embley² also has emphasized the part played by the increased excitability of the vagus mechanism, particularly during the early part of the administration. In his inhalation experiments he found that failure of respiration is mainly due to fall in blood pressure. With good blood pressure failure of respiration (his experiments concerned chloroform) is practically impossible. Restoration of respiration is dependent upon restoration of blood pressure. The chances of dangerous vagus inhibition are greatly increased by imperfect respiration.

From these findings it would seem fair to assume that any factor which prevents undue inhibition of the nervous mechanism of respiration, and which, by its stimulation of the respiratory centre, prevents fall in blood pressure, will have a beneficial influence upon the course of the anaesthesia. The oil of orange seems to exert this beneficial influence by dulling the sense of smell to such an extent that the odour of the anaesthetic is not noticeable during the administration.

Essence of orange is also useful when ethyl chloride, chloroform, or anethol are used as the introductory to ether by the open method.

When chloroform is given with the proper apparatus, providing for oxygen, air, and rebreathing throughout, the patient goes under and comes out of the anaesthetic as quickly as with nitrous oxide and oxygen, and with immunity unimpaired.

In emergency practice, when chloroform is used it is safer and better in every way to surround the mask with paper or a towel, and to have rebreathing throughout, thus diminishing the amount of the anaesthetic used by one-half or less. Safety is also increased by dipping the chloroform bottle in a vessel of hot water from time to time, in order to keep the agent warm. This is in line with the theory that warm anaesthetics are safer than cold.

"Open drop ether" is a crude, unscientific method of administering this drug. It is responsible for the ill repute borne by ether to-day, especially as regards nausea and vomiting. Administered in this way by the best "artist" in the world, it is irregular and uneven and conduces to a tendency to acidosis and resultant shock on account of the insufficient supply of oxygen.

The "gas-ether sequence"—administration of nitrous oxide followed by ether—is an even cruder and more dangerous method than the "open drop." It raises the blood pressure enormously, cyanoses the patient, and is responsible for many deaths.

Any apparatus dependent upon automatic suction is theoretically contraindicated on account of the unusual strain placed upon the respiratory centre.

The nitrous oxide-oxygen-ether sequence by the closed method removes all the objectionable features of the gas-ether sequence, and should be used whenever a closed method is indicated.

The endotracheal method, introduced by Meltzer, has been called the "luxury of breathing." The patient can be given this same luxury by the endopharyngeal method, which is now used by those who formerly employed the Meltzer technique. The same results are secured, however, with the vapour mask which some of us have been using for more than ten years.

The "vapour mask" is any chloroform mask covered with gauze and provided with some suitable arrangement for admitting the warmed oxygen-ether vapour. The ether may be vaporized by any air-compressing device, or oxygen may be used from any ordinary low-pressure oxygen tank, or the oxygen tank may be filled with air. This method ensures an even ether vapour tension.

If this vapour is passed to the mask just described, it is called an "open," or, more correctly, a "semi-open" method, inasmuch as the mask is usually covered with towels. If the vapour goes to a rubber bag it is called a "closed" method.

The essence of orange-ether sequence closed method is one in which a mask and a rubber bag are used. The bag is first filled with essence of orange odour, which is followed by ether vapour. The patient goes under the anaesthetic without change of colour, and with respiration and pulse normal. An even, deep, safe anaesthesia is maintained, and the patient comes out with as little discomfort as follows a good nitrous oxide-oxygen administration. The usual amount of ether used is 2½ ounces per hour, as against 4 to 8 ounces by the drop method.

The vapour mask, or semi-open method, should be used in operations on the head, neck, and upper thorax; the closed method in abdominal and other operations requiring relaxation.

The so-called gas-oxygen anaesthesia, supplemented with ether, should be used in selected cases only, and never as a routine. No method known to-day, either local or general, should be used as a routine.

Oil-ether colonic anaesthesia is now a recognized method of administering ether. The patient falls asleep in his bed, quietly, with pulse and respiration about normal, and colour reflex fully maintained at all times. This method is indicated wherever the element of fear is prominent, as in goitre cases, suspension laryngoscopies, and similar work. It is especially indicated in the obese alcoholic, a class of patients unsuited to any inhalation method. After a personal experience with colonic anaesthesia I prefer it to any other method.

While the latest available statistics give first place, as regards life, to nitrous oxide and oxygen, yet so many deaths have been reported from time to time, since the more general use of this combination, that we are forced to conclude that it is not as safe as is generally supposed, at least with our present methods of administration.

I have devised, therefore, and am now using, a semi-open method of administering nitrous oxide-oxygen and warmed ether vapour. This ether-nitrous oxide anaesthetic vapour is now warmed, moistened, oxygenated, and deodorized. When administered in this way the patient neither tastes nor smells the ether at any time. The mask described is used, allowing the patient at all times to get such an abundance of anaesthetic vapours that there is no strain whatever upon the respiratory centre.

Unquestionably, the preliminary and after treatment of the patient are as important as the anaesthetic or the method of administration. The anaesthetist, therefore, should have entire charge of this treatment, as well as the selection of the anaesthetic, if he is to be held responsible for the condition of the patient after the operation. These conditions being granted, it can readily be appreciated that we make no rash promises to any patient in assuring him of a pleasant and safe voyage through the narcotic zone.

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- ¹ Dastré, *Les anesthésiques*, Paris, 1901, pp. 104-9. ² Embley, *BRITISH MEDICAL JOURNAL*, April 5th, 12th, and 19th, 1902.