CHOICE OF ANESTHETICS IN NOSE AND THROAT SURGERY.*

BY SYLVESTER J. GOODMAN, PH. G., M. D., COLUMBUS, OHIO.

There are few subjects to which a student gives less attention during his college days than that of anesthesia. As Sir Frederick Treves has said: "There is a widespread impression that to give chloroform is a minor act—that the power comes with the granting of the diploma—and the significance of the procedure is sometimes emphasized by the remark: 'Well, if a man cannot give chloroform, what can he do?' This idea is being dispelled by the profession, slowly, to be sure (and sometimes only after one of you have had a most embarrassing experience), but nevertheless surely. I will, in the limited time allowed me for the discussion of so broad a subject, simply take up the agents most generally employed in the production of anesthesia for nose and throat surgery. No one anesthetic can be universally used if the best results are to be obtained.

The anesthetist must grasp the fact that every case of anesthesia is a study in itself, in the selection of the appropriate agent for safety and for the operator's convenience, fully appreciating that every case has its peculiar risks and after dangers which must be met in different ways in different individuals.

The relative mortality of the various general anesthetics is as follows:

Nitrous oxide, 1-100-000? (Luke.)

Ethyl bromide, 1-16000 (Patton),.

Ethyl chloride, 1-12000 (23 deaths in England in 1 year.) (Luke.)

Ether, 1-10000.

A. C. E., 1-7500 (1-2000).

Chloroform, 1-1000 (1-6000-Vaughn).

Anesthol, too early to judge (several deaths reported).

For the convenience of bringing the subject before you I will say that The Choice of Anesthetics is influenced by the following factors:

1. Type and condition of patient.
2. Age of patient.
3. Nature of operation.
4. Skill of the administrator.
5. Wishes of the operator.
6. General conditions.

* Read by request before The Oculists' and Aurists' Club, Columbus, O., Nov. 26, 1906

TYPE AND CONDITION OF PATIENT.

It is a remarkable fact that an individual whose health is somewhat impaired by disease is often a better subject for an anesthetic than a person who is in the enjoyment of perfect health. Among the laity there is a widespread impression that if the heart is sound, all must go well, whereas, in about 90 per cent. of the fatalities under chloroform, at the post-mortem examination the heart is found to be perfectly normal. (Luke.)

Far more importance must be attached to the nervous disposition and temperament of the patient, and the amount of alcohol and tobacco he is accustomed to use. A healthy, vigorous male adult is by no means the best subject for anesthesia in many cases, although the heart and lungs may be in excellent condition and able to stand any strain which may be put upon them, yet, the subject will not pass so readily and smoothly into the anesthetic sleep, in most cases, as a less robust type of patient, but will show greater tendency, as a rule, to struggling and excitement, which will interfere with the respiratory rhythm. Anemic patients, and the subjects of tuberculous disease (if we exclude active pulmonary tuberculosis), are better anesthetised with ether than with chloroform, as their blood pressure readily becomes unduly depressed by the latter anesthetic.

Fat people always give the anesthetist some trouble when the method employed involves any air limitations, and to fully anesthetise a fat, short-necked person by means of any inhaler, without producing undue secretion of mucus and saliva, with the accompanying cyanosis, is well nigh impossible. For this type of patient, therefore, chloroform, preceded by ethyl bromide, given with plenty of air, is indicated.

Edentulous people are sometimes troublesome owing to the tendency to suck in the lips in a valve-like fashion, and obstruct the air way. Patients who have *adenoid growths*, and *enlarged tonsils*, says Kolisko, "are not good subjects for any anesthetic, and in dealing with them chloroform should, as far as possible, be voided, especially in the case of children, as the adenoids are often associated with the "status lymphaticus" and persistent thymus gland.

This I do not believe to be true if the chloroform be preceded by ethylbromide, as much less chloroform is needed when this is done. In nearly 100 cases of ethylbromide-chloroform anesthesia for the removal of adenoids and tonsils, I have seen no untoward symptoms, and 75 per cent of the patients were children. In fact, most authorities on anesthesia concede the preference to chloroform rather than ether in operating on children generally.

In goitre, angina Ludovici, or any condition involving much constriction of the air passages with accompanying dyspnea, great care is necessary to use no anæsthetic or method of administration which will in any way hamper the breathing or cause cyanosis. Several deaths have occurred under nitrous oxid and ethyl chloride in such cases. Kocher and Berry refuse to use any anæsthetic in these cases, owing to the great danger. I have twice used ethyl bromide in these cases with no complications. Asthma contra-indicates the use of ether. In cardiac diseases, especially valvular diseases, chloroform is often better borne than ether, but great care must be used with either of them.

In patients with cardiac myasthenia, simple or fatty, in dilation without hypertrophy and in diseases of the coronary arteries, chloroform is especially contra-indicated as is also nitrous oxide. In conditions of renal inadequacy, both chloroform and ether are to be used with great care, for ether congests the kidney unduly, aggravating the albuminuria, while chloroform often increases the degenerative changes in the kidney substance. Diabetic patients are bad subjects for chloroform, for after regaining consciousness they frequently become comatose and die from acetonemia.

Insane patients should have chloroform preceded by ethyl bromide.

AGE OF PATIENT.

The age of the patient has little to do with the choice of anæsthetic except that in children there is a tendency to embarrassing secretion of mucus and saliva with cyanosis and stertor if ether is used.

SKILL OF ADMINISTRATOR.

Let us all agree that no man, however learned he may be, has any right to administer an anæsthetic until by long and careful observation, extended research and common sense judgment, he has prepared himself to undertake a task in many cases more dangerous than the operation. I would not for an instant have you think that any anæsthetic is entirely void of danger—even in the hands of an expert. But, gentlemen, who shall say that anything is safe in the hands of a tyro.

THE WISHES OF THE OPERATOR.

The wishes of the operator, with all due consideration of the patient's condition, etc., should be paramount, for it is obviously unfair to the surgeon and undesirable for the patient that the former should for one moment feel that he is embarrassed in his work in any way. (Luke.)

Further, in some cases, it may be desirable to commence with one anæsthetic and continue anesthesia with another. Many deaths un-

der anesthesia have been due to persistence in the use of an anesthetic which, to *the initiated*, was obviously unsuited for the patient. The preparation of the patient is also an important factor.

GENERAL CONDITIONS.

What would your wishes concerning the choice of an anesthetic amount to if a brother of the patient to be operated upon had lately died as a result of anesthesia? Suppose he had died of ether. No matter what you desire, I think you would use some other agent. Or, if for any reason, the family or friends are prejudiced against any agent, don't use it. Or, if you prefer ether and have only chloroform at hand, I suppose you had better use the latter.

Now what anesthetic shall be used? Shall it be ether; shall it be chloroform; or what?

Since of all the operations performed upon the nose and throat and accessory organs, requiring anesthesia, the removal of tonsils and adenoids is perhaps as common as any, we will confine our remarks to the application of anesthesia for this one operation. Most of you use ether; some use chloroform; several use ethyl bromide, or chloride, either alone or assisted by chloroform or ether.

Why you should prefer ether to chloroform, or either of them to ethyl bromide, I have failed as yet to be convinced. When you wish to operate in the region of the naso-pharynx, it seems to me that you would want as little blood and mucus as possible. The blood or mucus acts as a foreign body and obstructs respiration, exactly what you do not want. All authorities agree that ether embarrasses respiration. Ether also causes the production of an excess of mucus; and raises the blood pressure and increases the hemorrhage. Now what have you gained by its use? Suppose you had used chloroform. The mucus would have been less; to be sure, the heart and blood pressure would have been some depressed, but how much? The chloroform stimulates at first, and hence since the anesthesia is only momentary the hemorrhage would be about the same. But you have not used a respiratory depressant. Also when you administer the ether, whether by open drop or Allis method, the apparatus is cumbersome and if the anesthesia is to be renewed for a moment, the whole face must be covered up. With chloroform, the small Esmarch mask or pad or gauze of the forceps is all that is needed and anesthesia can be renewed while the surgeon works.

My method, which I am inclined to think the best, when used by one who is experienced (and please note that I say in experienced hands) is called the *ethyl bromide method*. When the technic of ad-

ministration is modified by the giving of a preliminary hypodermic injection of scopolamine and morphine, I refer to it as the *scopolamine morphine ethyl bromide method*."

How shall I convince you that this method is better than the use of ether or chloroform? One of your colleagues informs me that he likes ether because he can trust it to a student. You can not trust my method to a student. Another tells me he is prejudiced against chloroform because he had a death from chloroform, with the resulting advertisement. Now, gentlemen, when you trust ether to a student or chloroform to an inexperienced old man, long in his dotage, what can you expect? Ethyl bromide would kill, too, if placed into the same hands.

My desire is to convince you of the merits of this drug, when handled by an anesthetiser. Let us compare the manner in which the patient passes under the influence of the anesthesia when the different agents are used.

ETHER.

Apparatus—Allis inhaler, can of ether. Average time to cause relaxation from 3 to 15 minutes. Amount used 1 to 4 ounces, depending upon how much runs through the mask into the patient's eyes, etc.

First Stage. Swallowing, cough, some holding of breath, rather more common than with chloroform. Pulse accelerated and pupils large and mobile; conscious but no pain. Teeth may be pulled and incisions made. Easily awakened and no sickness; no relaxation.

Second Stage, Stage of Excitement. Patient becomes abruptly unconscious; memory, volition and intelligence abolished; questions answered in nonsensical manner; *struggling, shouting*, singing in robust patients. "Ether tremor" is seen. Face flushed, conjunctiva injected and perspiration on face. Pulse quickened and robust in quality. Breathing inclined to be hampered during this stage owing to muscular spasm. Do not annoy the etherizer by pumping the patient at this stage; leave them alone. The spasm passes off soon and the patient enters the

Third Stage, True Surgical Anesthesia. The cornea is now insensitive to touch, muscular relaxation is present and extremities are flaccid. Breathing is regular and stertorous. Pupils respond sluggishly to light. Pulse full, bounding and regular and somewhat slowed down. Free perspiration.

The *complications and difficulties* arising during ether anesthesia are:

1. Overdose.

2. Respiratory embarrassment leading to failure. This may occur during first stage, independent of overdose, and pass away as anesthesia becomes deeper.

3. Heart failure due to overdose or heart disease, goitre, hemorrhage.

4. Foreign bodies as blood, mucus, etc., may pass into larynx and trachea.

5. Apoplexy may occur when the arteries are brittle.

The *Contra-indications* according to Luke are:

1. Protracted operations on jaws or mouth.

2. Where cautery is used or where lights and fires are likely to cause an explosion.

3. In Bronchitis, Tuberculosis, Asthma, Emphysema.

4. Atheromatous arteries.

5. Renal diseases.

6. Empyema or ascites or pleural effusion.

7. *Large tonsils* or *adenoids*.

8. Brain operations, as mastoid, etc.

9. In all cases where mucus and secretions lead to respiratory obstruction or if patient's breathing becomes tumultuous.

CHLOROFORM.

Apparatus—Esmarch mask, small dropper bottle. Average time to cause relaxation 3 to 10 minutes. Amount used 1 to 4 drams. May burn patient's face. Motto of this drug, "Watch the breathing." Never worry about the pulse.

First Stage. Patient swallows and coughs slightly, restless, turns face away from anesthetic—if it is too close to his face he will hold his breath, and inevitably a long sighing respiration or gasp will follow. If this is borne in mind by the operator, he will save himself worry and embarrassment by leaving the patient alone and not jumping in and pumping the patient. This holding of the breath is only temporary and always passes away. Flashes of light, buzzing or hammering are heard in the ears. An exhilarating, thrilling sensation is felt through the body. Thoughts and ideas occur in the most rapid manner and are most vivid. Patient is conscious of surroundings but not of pain.

Second Stage. Patient now becomes rapidly unconscious. He will mutter, talk, laugh, talk nonsense, swear, respond irrationally to any questions. His conversation will run along the lines of his occupation. The face is flushed; the pulse is increased in rapidity. Pupils dilated and mobile and conjunctival reflex is still present. There is a tendency to sickness in this stage and any palor or depres-

sion of circulation in this stage should be taken as an indication for more chloroform. If the patient flushes and struggling occurs, chloroform should be withdrawn until the struggles subside.

Third Stage. The patient now becomes completely anesthetized. The breathing is regular and automatic like that of a sleeping person and often with a short quick snore. The pupils contract, but not always, and should react sluggishly to light. The lid reflex has disappeared. The muscles throughout the body are relaxed. The pulse is somewhat slower than normal and more compressible. The eye balls are fixed in a horizontal plane or rotating from side to side. You must be careful not to be misled by *false anesthesia*, especially in children, as the patient may be in a simple slumber. The pupil is then more contracted and even though the reflexes are absent, a pinch or cut will awaken them and the anesthetist is in a pretty fix. Therefore, when the pupil is very contracted, the administrator must be upon his guard to be sure of his ground before telling the operator to go ahead.

The *four signs* of full chloroform anesthesia are: 1. Automatic respiration. 2. Loss of conjunctival reflex. 3. Fixed and contracted pupil. 4. Muscular relaxation.

In *children* the *breathing* is all important; little reliance can be placed upon the pupil and less upon the conjunctival reflex. A useful sign, however, is the rotation of the eye balls downward upon the horizontal axis. However, in children it is especially well to give too little rather than too much, as we have no reflexes in children and there is danger of absolute poisoning.

The *principal troubles* arising during chloroform anesthesia, apart from chloroform poisoning, are:

1. Cessation of respiration.
2. Cardiac failure.
3. Vomiting.
4. Passage of food, mucus, etc., into air passages.

The *advantages* of *Chloroform* are:

1. Pleasant to smell and *seems* easy to administer. Produces little or no choking, so that children will often inhale it without resistance.
2. No special apparatus is needed.
3. Smallness of quantity required.
4. Quiet anesthesia.
5. Non-inflammable.

The *disadvantages* of *Chloroform* are:

1. High mortality.

2. Selective action on circulatory apparatus.
3. Depressant and protoplasmic poison.

ETHYL CHLORIDE AND ETHYL BROMIDE.

Now we come to the ethyls—ethyl chloride and ethyl bromide, as used in producing general anesthesia. Aside from chloroform and ether, ethyl chloride is used more extensively than any other agent. It has always appeared to be safe enough to trust to children. The anesthesia is produced in a few seconds without any struggling. There is no depression, nausea or vomiting and although it is very expensive, only 10 to 40 c. c. are consumed in the production of full surgical anesthesia. However, to get the best results a special mask must be used.

I used to think it about the ideal anesthetic, but when so great an authority as Mr. Luke, in his new work, reports 23 deaths in one year in England alone, I think that we should use a little caution before accepting ethyl chloride as a harmless anesthetic agent.

No such record of fatalities attends the use of ethyl bromide. The mortality, according to Patton, is only one in 16,000 anesthetics. I find record of only two deaths. I consider ethyl bromide (and note I do not say ethylene bromide) the ideal agent for short anesthesia. If the operation is to be a long one, I believe the ideal technic consists in producing surgical anesthesia with ethyl bromide and then continuing it with ether or chloroform *according to the type and condition of the patient.*

My method of producing anesthesia with ethyl bromide, used by me about 2000 times, is as follows: If the patient is a large man, or very nervous patient, or one of those big muscular bod-carriers that we see so often in the hospital, or for operations for the removal of tonsils and adenoids, I use what I call the "*quick method.*" This consists of dashing about one fluid dram of the drug upon a thick piece of gauze, and applying the same closely over the face. The patient is simply smothered in it. There are one or two struggles and all is over. This will suffice to keep them asleep for from three to five minutes. If, however, a prolonged operation is intended, as soon as the patient relaxes, say in about one minute the cloth is removed and ether or chloroform administered. This does away with the terrifically violent exciting stage seen in these cases when ether or chloroform is given from the start. If the patient is very ill, not so nervous, or not so strong as to be able to overcome the anaesthetizer during the administration of the ethyl bromide, I use the "*slow method.*" This consists in applying the Esmarch mask over the face, and then gradually dropping about thirty or forty drops of

ethyl bromide upon the mask, and in one-half to one minute the patient is sleeping quietly, and the same procedure as before takes place with reference to the ether or chloroform. The odor is not unpleasant, and scarcely any irritation of the air-passages is produced. If properly administered there is practically no stage of excitement. The face is flushed, the ears red, the eyes injected and the pupils more or less dilated. The heart action is accelerated, and the pulse increased in force. The respiration is quickened, and in some patients becomes snoring; but irregularity or arrest of respiration has never occurred. It does not produce nausea or vomiting. In fact, we seldom have any vomiting to amount to anything since I have been using ethyl bromide as a preliminary anesthetic. The duration of insensibility is brief, the awakening prompt, and there is little confusion of the mind when used for brief narcosis. In the fatal cases reported there is strong doubt, says Bartholow, in regard to the share of ethyl bromide in the result.

Any *untoward symptoms* during or following the use of ethyl bromide are due to one or more of the following causes:

1. Inexperience of anesthetist.
2. An impure article. Let me impress upon you that only a pure article is safe. I use Squibbs' only. It should be obtained in one-ounce vials and never allowed to stand around and decompose.
3. Some physicians have mistaken ethylene bromide for ethyl bromide. The former is very poisonous.
4. It should never be used about a gas light, as it is readily decomposed.
5. It should not be used in old men with sclerotic arteries without due caution. It should be borne in mind that when complete relaxation of muscles is required it is necessary to add a few drops of chloroform. One of the most serviceable uses of this agent is in the administration of anesthetics to the insane. Ethyl bromide is applied rapidly, and in less than one minute they are ready for the car. What under the circumstances would be a terrific exciting stage passes off quietly, and without the damaging effect of exertion upon the patient's strength.

There can be no doubt that many operations owe their fatal terminations to the large quantities of ether or chloroform given during the exciting stage. Mann of Buffalo (*American Medicine*, June 17), says that vomiting depends not on the kind of anesthetic used, but upon the amount. He always begins with ethyl chloride. Pneumonia, and injuries to the patient, as well as strain to the heart, are avoided by the elimination of the exciting stage of anesthesia. In

children the use of these agents is not only convenient, but necessary. Dr. Brown Kelly of Glasgow lauds ethyl bromide highly for operations about the nose and mouth, as removal of tonsils and adenoids, because it strikes the happy medium of combining the good points of chloroform, nitrous oxide and ether without their disadvantages, producing an anesthesia as quiet and free from asphyxial symptoms as chloroform, and as rapid as nitrous oxide, and as stimulating as ether.

The cost of ethyl bromide, bought as we buy it, is nineteen cents per ounce. The cost of ethyl chloride is eighty cents per tube. The amount of ethyl bromide used is about thirty to sixty minims, costing about one to two and one-half cents per application. Ethyl chloride leaves a garlic odor to the breath; ethyl bromide does not.

CONCLUSION.

For brief operations ethyl bromide is the best anesthetic. For preliminary anesthesia, this product is not only convenient, but I would impress you with the fact that there is less danger when the exciting stage is eliminated by its use. Ethyl bromide is better than ethyl chloride. Severe nausea and vomiting are seldom seen after prolonged anesthesia when this agent has been used as preliminary anesthetic. Ethyl bromide is a heart stimulant and not depressant. This compound is absolutely safe in the hands of any man who understands anesthesia; nothing is safe in the hands of a novice. The average time for producing complete insensibility is from thirty to sixty seconds, but seldom longer than thirty seconds.

The *advantages* of ethyl bromide over chloroform are: 1. It can be given with the patient in any position. 2. Anesthesia is induced very much more quickly. 3. There is no struggling. 4. A measured dose can be given. 5. It is much safer. 6. The after-effects are trifling or absent.

The *advantages* over nitrous oxide are: 1. The anesthesia is of a better type; quieter; absence of suffocative symptoms. 2. No cumbrous apparatus is necessary. 3. The available anesthesia is about twice as long.

The *advantages* over ether are: 1. Much pleasanter to take. 2. Induction of anesthesia is much quicker and no struggling. 3. There is no cyanosis or secretion of mucus. 4. Does not leave an unpleasant taste in the mouth or smell in the room. 5. The after-effects are much less.

238 East State street.