Alice Magaw and the great secret of open drop anesthesia

With this issue of the AANA Journal, “Imagining in Time” begins an occasional series that will reprint historical articles written by early and pioneer nurse anesthetists. The purpose is to keep the past alive and stimulate research interest. A brief commentary will accompany each article and, whenever possible, a bibliography will be included.

 Appropriately, the series commences with the “Mother of Anesthesia,” Alice Magaw, CRNA (1860-1928), who wrote five articles between 1899 and 1906. Featured is a reprint of Magaw’s fifth article titled “A review of over fourteen thousand surgical anesthesias,” which was published in a 1906 issue of Surgery, Gynecology and Obstetrics.

Key words: Alice Magaw, chloroform, ether.

Alice Magaw, CRNA (1860-1928), wrote five articles between 1899 and 1906 (Table). In each she recounted, with characteristic modesty, her extensive and ever-increasing experiences with the administration of chloroform and ether. Magaw discussed her preference for ether over chloroform, but more important, she described elements of her unique approach to patient care, a technique that revolutionized the way anesthesia was given.

Before Magaw’s day, and for a while thereafter, the “choking and smothering” method of in-

Table. Articles authored by Alice Magaw, CRNA*

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duction was the practice in most hospitals. This violent and dangerous practice was frightening to patients and a source of anesthetic morbidity and mortality. It, therefore, posed an impediment to the expansion of surgery. Magaw would routinely assess her patients early in order to gain their confidence and "do away with a great deal of fear." She would then base her anesthetic plan on that assessment, as well as the needs and requirements of the surgeon. The "great secret" to induction, she wrote, was not to "crowd," or hurry, the anesthetic. To be successful, the anesthetist had to proceed slowly, giving the patient appropriate verbal assurances while carefully titrating a deep anesthetic state based upon vigilant observation of the rate and quality of the pulse and respirations, as well as the condition of the pupils. 1 Alice Magaw perfected and popularized this "great secret" of open drop anesthesia and changed anesthesia practice forever. Magaw's accomplishments were made more remarkable by the fact that she administered more than 14,000 anesthetics without encountering an anesthetic-related death. Nurse anesthetists old enough to have administered open drop anesthesia might be able to appreciate the magnitude of Magaw's work. The rest of us can only marvel at how an "anesthetizer" could do so much with so little (Figure).

REFERENCE

A review of over fourteen thousand surgical anaesthesias*

Alice Magaw, Rochester, Minnesota
Anaesthetist to St. Mary's Hospital

Since the discovery of ether in 1846 by William Morton, much has been written about anaesthetics and their administration, and still ether and better etherization is more in favor today than ever before.

We are indebted to Dr. Bevan and Dr. Mellish for their most excellent articles on this important subject, on the after-effects as well as the administration of anaesthetics.

At St. Mary's Hospital our preference has always been ether. In 1905, out of 3,080 anaesthesias 2,847 were ether. In 14,380 anaesthetics given by me, I have yet to see a death directly from the anaesthetic, but, no doubt, have had my share of trouble in its administration, although artificial respiration with us is almost unheard of. Our experience with ether has become more gratifying each year. In my series of cases, the “open method” has been the method of choice. We have tried almost all methods advocated that seemed at all reasonable, such as nitrous oxide gas, as a preliminary to ether (this method was used in 1,000 cases), a mixture of scopolamine and morphine as a preliminary to ether in 73 cases, also chloroform and ether, and have found them to be very unsatisfactory, if not harmful, and have returned to ether “drop method” each time, which method we have used for over ten years.

On account of this method not being followed properly, it is not always appreciated. We use a four-ounce ether-can and fit an ordinary cork with a groove on either side into its mouth, fill one groove with absorbent cotton and let it extend out of the can about one inch. One can regulate the drop easily by the manner in which the point is clipped. We usually fix two cans, one with a large dropper, and use it until the patient is fully under the anaesthetic, and then change to the other can with the small dropper, and continue its use during the operation.

Patients usually walk into the operating-room and mount the table with assistance. All foreign bodies, such as artificial teeth, chewing gum, etc., are removed. The hands are fastened loosely across the chest with a wide gauze bandage, to prevent the arms from falling over the sharp edges of the table, an accident which so often causes musculospiral paralysis. A pad of moistened cotton is placed over the eyes to protect them from the anaesthetic. If, during the course of administration, some of the anaesthetic should fall into the eye, drop a few drops of castor-oil into the conjunctival sac, to prevent the conjunctivitis that would otherwise follow.

[Positioning]

It is a mistake to think that the same elevation of the head will do for all patients. The anaesthetist should elevate the chin to such a position as not to bend the neck too far back or approximate the jaw too near the sternum. Proper elevation of the head will relax all tissues of the neck and give more freedom in breathing. This, also, can be said of the jaw. Holding the jaw up and forward, and keeping it in position so that the patient gets the greatest amount of air possible, is an important feature in giving an anaesthetic. While too much emphasis cannot be laid on this necessary requisite in giving an anaesthetic, all jaws cannot be handled in the same manner. When a patient has removed a double set of artificial teeth, the tongue will often cleave to the roof of the mouth during the administration, and raising the jaw sets the gums so firmly together that most of the air is shut out, and this may not be noticed until the patient is cyanotic. We have found, in this class of cases, that if the jaw is held but slightly up and forward and the thumb of the same hand is inserted between the gums, thereby holding the tongue down, faulty respiration will be corrected at once and the color restored. This is one of the instances where the holding up of the jaw too firmly can be overdone.

The inhaler used is the improved Esmarch, with two thicknesses of stockinet (frame boiled and stockinet changed after each patient). We use the dropper described, dropping as slowly and carefully in giving ether as though it were chloroform, until the patient's face is flushed, and then a few layers of surgeon's gauze are added, and the ether given a trifle faster until the patient is surgically etherized; then return is made to the same covering as at the start, and the regular drop continued throughout the operation.

As it requires very little ether to keep a patient surgically etherized, one can change to the smaller dropper during the operation. A much deeper narcosis is required to start an operation or to make the incision than later on, when the operation is in progress. It is useless to touch the cornea, as so many advocate, as it tells us nothing and is unscientific. Only the inexperienced take the pulse and touch the conjunctiva when giving ether.
[The manner of approach]

Suggestion is a great aid in producing a comfortable narcosis. The anaesthetist must be able to inspire confidence in the patient, and a great deal depends on the manner of approach. One must be quick to notice the temperament, and decide which mode of suggestion will be the most effective in the particular case: the abrupt, crude, and very firm, or the reasonable, sensible, and natural. The latter mode is far the best in the majority of cases. The subconscious or secondary self is particularly susceptible to suggestive influence; therefore, during the administration, the anaesthetist should make those suggestions that would be most pleasing to this particular subject. Patients should be prepared for each stage of the anaesthesia with an explanation of just how the anaesthetic is expected to affect him; “talk him to sleep,” with the addition of as little ether as possible. We have one rule: patients are not allowed to talk, as by talking or counting patients are more apt to become noisy and boisterous. Never bid a patient to “breathe deep,” for in so doing a feeling of suffocation is sure to follow and the patient is also apt to struggle.

In gall-bladder work, nearness to the diaphragm causes an irregular respiration, and this is sometimes mistaken as a call for more anaesthetic, when more often it is just the reverse. If the patient is surgically anaesthetized, the irregular breathing and grunting does not interfere with the surgeon. Instead of drowning the patient with the anaesthetic, remove the mask at this stage and allow him plenty of air, and he will not become cyanotic. This is also true of operations on the sphincter muscles. Any manipulation will be followed by the same symptoms. Respiration is often interfered with in this class of cases. Obstruction is caused by the tongue falling back and depressing the epiglottis. Should any of these symptoms arise during the administration, raise the jaw up and forward, and instead of using tongue-forceps, catch the tongue with a piece of gauze and draw it up and toward the nose, a little to one side, withdrawing the anaesthetic. Should mucus become troublesome, one can easily wipe it out with an extra piece of gauze prepared for that purpose.

The dose required for each individual patient cannot be estimated so as to be of any value, as it depends largely on the temperament of the patient, pathological condition present, time consumed in anaesthetizing, and operating. The only one that can judge is the educated anaesthetist, who will give only what is needed to do good work. From experience we know a patient can be brought under ether in from three to five minutes, and, when ready, patients do better if the operation is started at once. Often the anaesthetist is blamed for not having some positive sign of complete narcosis. We have never found a single positive sign upon which we could rely. If the surgeon and anaesthetist are accustomed to each other, the surgeon seldom asks if the patient is ready. He knows from the deep respiration, color, and relaxation. Failures are in the acute peritonitis cases and in alcoholics. There are many signs that guide, such as deep respiration, relaxed jaw, as well as relaxed muscles; yet these signs sometimes fail. If the patient is kept in an even surgical anaesthesia, there is not enough change in the patient to warrant all the useless fussiness we sometimes see on the part of the anaesthetist. I rely a great deal on the relaxation of the jaw, both before and during the operation. When the Trendelenburg position is necessary, it means trouble for the surgeon, and simply delays all work, to start an operation before complete relaxation.

During the operation, as soon as the patient begins to get control of the jaw, more complete narcosis is required. If the jaw is relaxed and in place, respiration deep and regular, color normal, quality of pulse good, there need be no fear about the rate of pulse or the pupils. Other points being equal, they are certain to be right.

As a rule, any person fit for a serious operation is also fit for an anaesthetic, but no one is so free from danger that care in watching its effects can be dispensed with. The cases requiring the greatest care are not the young and anaemic, for whom a small dose is sufficient, but the strong and vigorous, who inhale deeply and are inclined to struggle.

[Attention to detail]

There is no class of cases that requires more close watching of every detail than the stomach cases, because they are poor subjects for anaesthesia of any kind, and the anaesthetist should be familiar with each step of the operation, so as not to give one drop more of the anaesthetic than is absolutely necessary. We give one sixth of a grain of morphine thirty minutes before the administration of ether, and the patient is given just enough to produce surgical anaesthesia, and as soon as the stomach is explored and the method of operation decided upon, the ether is withdrawn, the surgeon being able to continue the operation, no more being given until time to close the incision.

In this class of cases the patients are allowed to become almost conscious many times, as the stomach is not sensitive, and there is no pain in the visceral work; thus we are able to complete the operation and avoid vomiting with an exceedingly small amount of anaesthetic.
The rolling of the eyeballs as noted by Simpson, swallowing, and control of the jaw are signs of returning consciousness, and a call for more ether. While we give less anaesthetic in this class of cases than in any other, it is this class that is most prone to pneumonia.

During the thirteen years' work at St. Mary's Hospital all patients have been anaesthetized on the operating-table in the operating-room, and preparation of the patient was going on at the same time. Experience has taught us that preparation of the patient while going under the anaesthetic is one of the important factors in producing a rapid surgical narcosis; for it diverts his attention, and much less anaesthetic is required. It matters not in what position the patient must be for the operation, we fix him accordingly, and the preparation is begun at the same time as the anaesthetic, and we feel certain that this procedure enables us to hasten narcosis.

In the Trendelenburg position, where the preparation is in progress during the administration of the anaesthetic, the deep respiration, etc., empties the pelvis, so that by the time the operation is started the small bowel will be found in the lower abdomen and out of the way, and may be packed off. We have found this practice more helpful to the surgeon than placing the patient in position after the completion of narcosis.

In giving an anaesthetic for this class of surgery, the skill and patience of the anaesthetist is tried to the extreme; the patient must be fully anaesthetized, but not too profoundly. Patients having an acute peritonitis, as is so often found in this class of cases, require a much larger amount of anaesthetic to produce relaxation of the abdominal muscles. When the patient is prepared during the administration of the anaesthetic, there is no time lost, the surgeon and his assistant being ready by the time the patient is surgically anaesthetized. Another important reason for anaesthetizing the patient on the operating-table is, that in lifting and shifting a patient about, he is apt to regain consciousness, with vomiting, etc., and the administrator is not positive of the condition of his patient. Should ether produce difficult breathing, profuse secretion of mucus, or cough, lift the mask from the face, allow a liberal amount of air, and then continue with the ether. In giving plenty of air when needed, and less anaesthetic, we have found little use for an oxygen-tank, a loaded hypodermic syringe, or tongue-forceps. It is far better for the anaesthetist to become skillful in watching for symptoms and preventing them, than to be so proficient in the use of the three articles mentioned. We are exceedingly careful in our selection of cases with colds. An acute cold is a contraindication to any anaesthetic, but as soon as the cold becomes chronic there is not much danger from etherization, and instead of operating during an acute cold and giving chloroform (unless in an emergency), we wait a few days until the acute attack has passed, and then they are as good subjects for ether as for any other anaesthetic. Chronic bronchitis is often improved by an anaesthetic.

Pulmonary tubercular cases stand ether well. It has been proven that pneumonias follow a local anaesthesia as well as a general, so the trouble is not wholly from the anaesthetic. We often have a lung oedema present during the administration of an anaesthetic, and for several hours after an operation, that is often mistaken for ether pneumonia, but the oedema will clear up about the time ether pneumonia should begin.

There is also an embolic and septic pneumonia that occurs independently of the anaesthetic and is due to an infection, and will sometimes occur with or without a general anaesthetic.

The dangers of general anaesthesia depend more on the lack of experience and incompetency of the anaesthetist than on the drug itself, in most instances. Many operations do not demand the long anaesthesia of ether, with its discomforts, neither do they warrant the dangers of chloroform anaesthesia. In this class of operations we have been using primary anaesthesia, and find it preferable to nitrous oxide gas, chloroform, or ethyl bromide.

Formerly, operations for exophthalmic goiter were looked upon with a great deal of dread, on account of the anaesthetic. We have found these cases, when properly managed, and the ether given by the "drop method," were as good subjects for anaesthesia as any other class of cases of the same gravity. We also give these cases 1/6 of a grain of atropine, the latter to avoid tracheal mucus, thirty minutes before the operation, and find it very helpful in tidying the patient along with but a small amount of anaesthetic.

[Chloroform versus ether]

The method of giving chloroform is quite like that of ether; yet there are marked differences to observe. Chloroform should be given with more air and in less quantity, with the regular and small drop. Chloroform acts quickly, and should be given slowly and carefully, the pulse being taken at the facial or temporal arteries. Anaesthetists should never allow either the patient or themselves to feel hurried. Stop inhalation as soon as patient has reached surgical anaesthesia, giving just what is needed, and not one drop more. When struggling
occurs, withdraw the chloroform entirely until the patient is quiet, as struggling will produce deep inhalation; hence the danger. Embarrassment in respiration during the administration of chloroform should always be considered serious, and it requires prompt attention and an immediate withdrawal of the drug.

The pulse often misleads the novice. It may be very weak just before vomiting, when one might think there was less need of anaesthetic, while really it is a call for more. A thready, intermittent pulse indicates trouble. As Dr. Finney says: "It is well to watch the character and rate of the pulse, but of far more importance to watch the respiration as the earliest indication of danger." The eyes may give warning of danger. A rapidly dilating and fixed pupil is a danger signal, while a pupil contracted to normal size or a little less indicates surgical anaesthesia. The color of the blood is also important. Watch all symptoms, but do not rely on any one of them. When giving chloroform to children, I never feel safe if the child is profoundly under, and I try to avoid this condition, aiming to keep it as nearly as possible in moderate anaesthesia. An unsatisfactory pulse or respiration is a call for plenty of air. By doing this there will be little need of the numerous drugs so often resorted to.

Nearly all the fatalities on the operating-table due to an anaesthetic are from chloroform, either mixed with some anaesthetic or given unadulterated. Public opinion is so much in favor of ether at the present day, that if accidents in its use occur, the surgeon will not be blamed, and it is to his interest, as well as that of his patient, to see to it that his anaesthetist becomes proficient in the administration of all anaesthetics, especially ether.

[A competent anaesthetist]

While surgeons know that a competent anaesthetist is one of the most important factors in the operating-room for his own comfort, as well as for that of his patient, there is no class of work that has so little encouragement, and few are willing to follow this line of work (that, in difficulty and nerve-strain, is next to that of a surgeon) long enough to become familiar with the first requirements of a good anaesthetizer.

To give an anaesthetic properly is all one person can do, and he who undertakes to learn surgery at the same time makes a serious mistake. It has been my privilege to instruct several in the administration of anaesthetics, and I must say that nurses become the most proficient in this line of work. They do not aspire to become either a surgeon or an assistant surgeon; hence it is not difficult for them to give their undivided attention to the anaesthetic. I am sure the time is not far distant when nurses will be looked upon as best fitted for the administration of anaesthetics.

One derives little or no benefit from textbooks. While one should be competent in the theoretical part of this important work, there is nothing so helpful to the anaesthetist as the hard school of practical experience.