

5. The advantages of ivory plates in transverse fractures are; they fit closely into the fragments; do not loosen up; they are strong enough to withstand any pull made by muscles attached to the fragments; they will not allow angulation, especially if put in at right angles to the greatest tendency of displacement, or, better, at right angles to the greatest pull of the muscles, they will be gradually absorbed, and never act as a foreign body in the bone.

4137 South Halsted Street.

ABSTRACT OF DISCUSSION

DR. F. J. COTTON, Boston: The first of those plates did not show an osteoblastic absorption, but, rather, a granulation absorption.

DR. PAUL B. MAGNUSON, Chicago: This plate was practically translucent when I took it out. In six weeks it had softened so much from the absorption of fluids and become tightened into the bone so firmly that it was difficult to get it out. It is eroded at both ends, but little in

DR. PAUL B. MAGNUSON, Chicago: I agree with Dr. Albee that a live bone-graft is the ideal substance. I doubt that it is tolerated by the tissues better, but it is more stimulating to the growth of bone than anything else. Unfortunately, we cannot always get a piece of bone to fit accurately. We must do two operations; and few of us are skilful enough to fit a piece of bone into a slot. It requires great experience in this line of work. This operation was designed for the use of the average man doing bone surgery, so that he cannot possibly make a mistake. All that has to be done is to cut exactly the width of the space he wishes to fit the plate into with parallel circular saws, joining the ends of these incisions, and then drill two holes exactly the size he needs; he then has a plate that fits the slot exactly. After the two holes are drilled, put in the ivory pegs at an angle to the plate through both sides of the bone. The procedure is mechanically accurate. The ivory would not, of course, hold on the outside of the bone, because it is not strong enough; but when it is braced by the cortex on each side it will hold, because it is mechanically correct.

As to Dr. Lord's remark about handling a fracture carefully, of course, this is my baby and my pet, and we are sometimes

prejudiced in favor of our own children. Nevertheless, I have maltreated these plates before sewing up the wound, purposely, in order to see whether or not I could pull them loose. I would rather have them come loose at that time than after the patient has gone back to bed, and therefore have taken particular pains to try to break them beforehand; when I put the patients back to bed, I feel sure that the plate will hold its position until the extension apparatus, or whatever I use, is taken off. I have never had the pegs break. There is practically no strain on them. They are put through the upper side of the cortex and there is no leverage to snap them off. If we had leverage, that might happen.

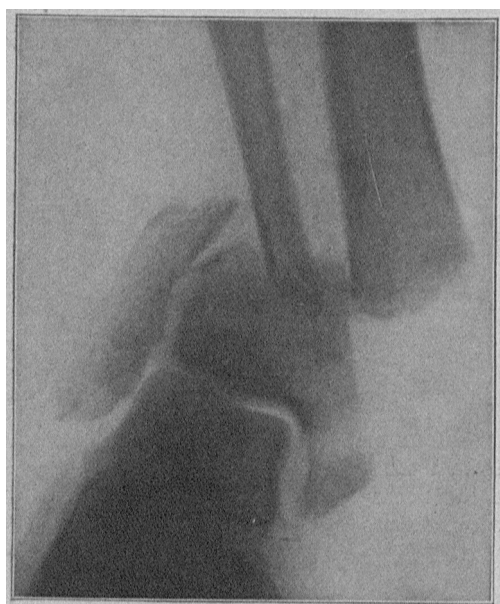


Fig. 8.—Fracture of both bones of the leg.

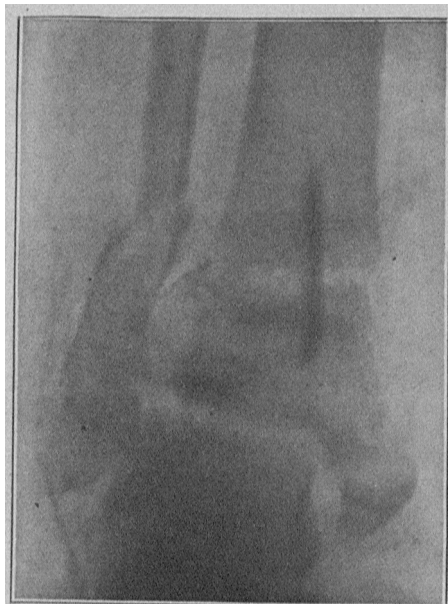


Fig. 9.—Same as Fig. 8, one day after operation. Ivory plate in tibia. Pegs seen as faint shadows on each side of fracture.

the middle, at the seat of the fracture. It was just outside the seat of fracture that the greatest erosion took place.

DR. D. B. PREMISTER, Chicago: Most of the osteoclasts producing absorption of dead bone or ivory are not giant cells, but the ordinary fibroblasts. In my histologic work I have observed extensive lacunar absorption where giant cells were entirely absent.

DR. JOHN PRENTISS LORD, Omaha, Neb.: I should like to have Dr. Magnuson tell us whether he does not think that such work as this would be likely to be undone, unless there is some apparatus for holding the plate securely until the final dressing is applied. It seems to me that there is an opportunity for caution against undertaking to do this work without a fixation apparatus; otherwise I should think that the screws would break in inexperienced hands.

DR. FRED H. ALBEE, New York: Last year, in the Surgical Section of the American Medical Association, and in the American Orthopedic Association, I reported a scheme similar to this for holding ivory. I have applied it to the femur and other bones, and have had no trouble with breaking of the bone. I have used it as a bone-graft larger in size than this ivory plate; but the bone-plate is in there in an efficient manner mechanically, I believe. Dovetailed, as it is, it holds the fragments efficiently.

A DISCUSSION OF VARIOUS ANESTHETICS AND METHODS

EXPERIMENTAL OBSERVATIONS*

BERNARD FRANCIS McGRATH, M.D.

ROCHESTER, MINN.

The purpose of this paper is, first, briefly to discuss the present status of the question of anesthetics, secondly, to contribute data from the Mayo Clinic, and, lastly, to present some preliminary observations on an experimental work which is to be continued at length.

A stimulus has recently been applied to the question of anesthesia, which has resulted in a wide-spread interest and in laudable endeavors toward advancement. New anesthetics and various combinations have been employed, apparatus aiming at accuracy has been designed and different routes of administration have

* Read in the Section on Pharmacology and Therapeutics of the American Medical Association, at the Sixty-Fourth Annual Session, held at Minneapolis, June, 1913.

* From the Mayo Clinic.

been practiced. Commendable and seemingly progressive as are all these efforts, still does not their multiplicity itself emphasize the general state of inefficiency that exists?

To enumerate and describe the several anesthetics, devices and methods which have been advanced would be an unnecessary repetition, since their details are already known, or at least are easily available in the literature. Each has enthusiastic advocates, but which can withstand the test of time?

It has been authoritatively stated that any of the recognized anesthetics or methods is safe in the hands of an expert anesthetist. In an endeavor to place this phase of surgery on an efficient basis should we not begin by investigating the undermost stones in the foundation? In analyzing these is not the administrator of the anesthetic one of the first to attract our attention? Embodied in the expert are those qualities which are essential for the successful production of anesthesia. He guards against

Although extrinsic to the patient, yet seemingly comprehended in this principle, are certain other "noci-associations" which, until recently, were nearly omnipresent in the hospitals of this country, and even to-day exist to a culpable degree. I refer to the inexperienced house-officer as the official anesthetist of the hospital, and the indirect detriment which results to the patient through the mental disturbance, and, in consequence, the curtailed efficiency of the operator. The chain of asepsis may be intact, the surgical assistants adequately equipped with skill and discipline, and the surgeon most able; but, with the patient at one period rigid and practically inoperable, the next period assuming an ante-mortem aspect, the operator must necessarily be incapable of his best effort. Therein an injustice has been done, since the benefit to the patient, if the anesthetist be excepted, is not commensurate with the pathologic condition which he presents and the efficiency of his environments.

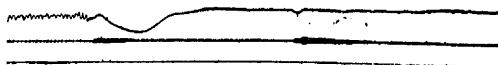


Fig. 1.—No. 635 a. Intravenous ether, 5 per cent. First part of tracing, no anesthesia. Note the result of careful induction and maintenance of anesthesia. Duration one and one-half hours.

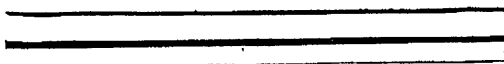


Fig. 2.—No. 635 b. Tracing made at the end of one hour, surgical anesthesia, intravenous ether, 5 per cent.



Fig. 3.—No. 681. Intravenous ether, 5 per cent. First part of tracing, local anesthesia. Note early effects of anesthetic on cardiac action and respirations and relation of respiratory failure to effect on heart. Spontaneous recovery.

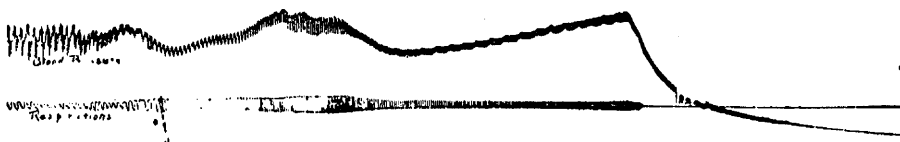


Fig. 4.—No. 677. Intravenous ether, 5 per cent. First part of tracing, local anesthesia. Note induction of light anesthesia in first and second thirds of tracing. In the last third note effect of "full flow" for twenty seconds (solution, 126.60 c.c., ether, 6.30 c.c.). No recovery. Heart failed about two minutes after cessation of respirations.

the use of anesthetics which contain impurities; his extensive experience frequently enables him to obviate deleterious psychic conditions preceding the operation; his skill in administering ameliorates the mental and physical disturbances of the initial stages of anesthesia; he avoids the recognized noxious effects caused by vacillation between a light and deep state, and finally, the expert administers the anesthetic only in amount sufficient for the conditions, thereby reducing to the minimum immediate postanesthetic and remote organic effects.

Crile speaks of "two great classes of association, namely, those that are injurious and those that are beneficial. The injurious kind are called 'noci-association,' that is, noxious or injurious associations." Crile's scientific defense of his theory, together with his and others' observations of its practical application, is sufficiently convincing to demand serious consideration and a general effort to test its soundness.

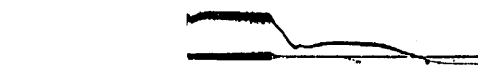


Fig. 5.—No. 615. Intravenous ether, 5 per cent. Showing effect of overdose—"full flow," thirty seconds (100 c.c. solution; ether, 9.5 c.c.). Note continuance of cardiac action (upper line) for about four minutes after cessation of respirations.



Fig. 6.—No. 675. Intravenous ether, 5 per cent. First part of tracing, local anesthesia. Note effect of accidental overdose and ineffectual efforts at resuscitation. Total solution, 450 c.c.; ether, 22.5 c.c. Time, six minutes.

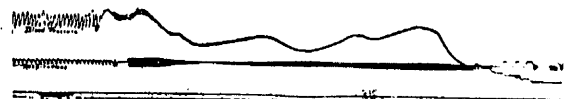


Fig. 7.—No. 672. Intravenous ether, 5 per cent. First part of tracing, no anesthesia. Note induction of anesthesia, practically synchronous cardiac and respiratory failures and ineffectual efforts at resuscitation. Total solution, 300 c.c.; ether, 15 c.c.



Fig. 8.—No. 682. Intravenous ether, 5 per cent. Note relation of respiratory to cardiac failure and the ineffectual efforts at resuscitation, when artificial respiration, heart-massage and abdominal pressure were begun late. Total solution, 350 c.c.; ether, 17.5 c.c.

The best anesthetic administered by the most expert anesthetist would be the ideal in anesthesia. Such an ideal condition is no more feasible than that every surgical operation be performed with the best technic by the most skillful surgeon. The reasons are obvious. That the expert anesthetist is not now and never will be generally available is self-evident, but that there is a vast territory of the medical field in which such idealism could and should be applied the most skeptical will not deny.

It is but truth to state that medical schools in general have not adequately taught and emphasized this seriously important branch of medicine. In many instances men are graduated with little theoretical and far less practical knowledge of the subject. Just as the student with a bent toward surgery, pathology or any of the other branches of medicine should be encouraged and scientifically trained in that direction, so, too, should the one

adapted to the work of anesthesia be similarly encouraged and guided.

One has but to scan the statistical history of anesthesia to note the wide divergence of results. This diversity seems to be due primarily to a lack of parallelism of all the factors concerned. Some of the obviously essential factors in estimating the comparative value of anesthetics and methods are the purity of the drugs, the skillfulness of the anesthetist, a reasonable parallelism in the number of cases observed and the condition of the patients.

The comparative value of the anesthetics more recently advanced and the methods of administering them are at present and for some time must remain in the balance.

It is easily conceivable that some of the more recently advocated methods of inducing anesthesia are positively indicated in some operative procedures, and at least helpful toward efficiency in others. This is particularly true when applied to operations about the head and neck and within the thorax. In this regard the methods of Crile,

patient, and the remote effect on the organs of the body are more than those of any other anesthetic or method.

The advancement which is being made in the application of local anesthetics augurs well for substantial aid to surgery along these lines and this affords a most fertile field for research. General anesthesia is at best a fairly wide deviation from the normal, but, in the present state of our knowledge, is absolutely indicated in many cases. With the scientific advancement of local anesthesia, we may hope to see the number of indications for general anesthesia reduced to a minimum.

Finally, praiseworthy and seemingly progressive as are the various endeavors which are being made in the application of new general anesthetics and methods, nevertheless it appears that one of the most essential steps, if not, indeed, the most essential step, toward placing the question of anesthesia on an efficient basis is the training and encouragement of the skilled anesthetist.



Fig. 9.—No. 683 c. Intravenous ether, 3 per cent. First third of tracing shows effects of "overdose"—ether 9.4 c.c. in one minute and epinephrin 3 drops; middle third, temporary signs of recovery, with subsequent failure, despite efforts at resuscitation.

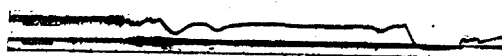


Fig. 10.—No. 673 a. Intravenous ether, 5 per cent. First part of tracing, local anesthesia. Note induction in middle third and effect of twenty seconds' full-flow—solution, 126 c.c.; ether, 6.3 c.c.—in last third. Abdominal pressure. Recovery.

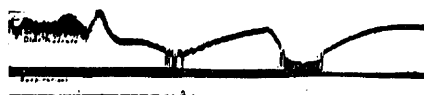


Fig. 11.—No. 633 a. Intravenous ether, 3 per cent. First part of tracing, no anesthesia. Note induction of anesthesia (light). Last of tracing depicts the effects of 30 seconds' "full flow," 4.7 c.c. ether, with spontaneous recovery.

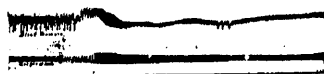


Fig. 12.—No. 688. Inhalation ether, automatic. First part of tracing, no anesthesia. Surgical anesthesia in about two minutes. Note on tracing good result of careful induction and use of air with ether.

Meltzer and Auer and others are particularly applicable. The indications for the intravenous administration of anesthetics seem at present to be very limited, although time and research may radically alter this view.

In making a wide survey of the field of surgical achievements, including statistical history, supplemented by the opinions of keen and progressive observers, no other anesthetic or method for application in general is so soundly supported by time and experience as ether administered by an expert, with a due allowance of air to the patient. Compared with other anesthetics and methods, ether by the so-called "drop" method is at least as immediately safe, is more available, more economic, and more conducive to efficiency in extensive work. I am not cognizant of data sufficiently reliable and extensive to prove that in the hands of the skilful, the immediate deleterious effect on the condition and comfort of the



Fig. 13.—No. 319 b. Inhalation ether, automatic. Note in middle third of tracing the effect of uneven administration of anesthetic. Upper tracing, cardiac; lower, respiratory. Spontaneous recovery.



Fig. 14. No. 676. Intravenous chloroform, 1.5 per cent. First part of tracing, local anesthesia. Note effect on cardiac action during induction of anesthesia. Spontaneous return to normal.

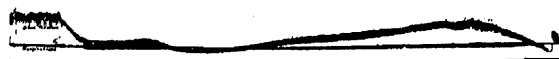


Fig. 15.—No. 657. Intravenous chloroform, 2.5 per cent. First part of tracing, local anesthesia. Total solution, 475 c.c.; chloroform, 11.87 c.c., in eleven minutes. Note cardiac and respiratory failure. Efforts at resuscitation futile.



Fig. 16.—No. 621. Intravenous chloroform, 2.5 per cent. Note induction and failure in first and middle third. Cardiac action and respirations ceased almost simultaneously. Efforts at resuscitation effectual.

DATA FROM THE MAYO CLINIC

From the year 1900 to the beginning of the present year the respective numbers of general anesthetics administered were as follows: ether, 49,057; chloroform, 1,300; nitrous oxid (usually nitrous oxid-ether sequence), 1,000, and ether-chloroform sequence, 796. The nitrous oxid administrations were made during the years from 1900 to 1904, inclusive. Since 1907 chloroform alone has been employed in one case. The mode of administering ether is the so-called "drop" method. Besides the before-mentioned, several of the local anesthetics were employed.

No death ascribable to the anesthetic alone has been noted. None of the present anesthetists has even administered a stimulant hypodermically during operation. Excitement in the initial stages of anesthesia has been very rarely observed. Postanesthetic effects, such as nausea and vomiting, have been, as a rule, inconsiderable.

PRELIMINARY ADMINISTRATION OF DRUGS

In cases of exophthalmic goiter in which operation was performed without general anesthesia, scopolamin, 1/200 grain, and morphin, 1/6 grain, is used. If a general anesthetic is to be administered, atropin 1/150 grain, is also employed. In operations for ordinary goiter, morphin, 1/6 grain, and atropin, 1/150 grain, are used. In operations on the stomach and rectum, morphin, 1/6 grain, is used. If a patient has had bronchitis or a cold, morphin, 1/6 grain, and atropin, 1/150 grain, is employed. Scopolamin and morphin are administered to quiet nervousness, but apparently as a result increased excitement has been occasionally observed. It is considered probable that following the use of these drugs a smaller amount of the general anesthetic is necessary. In operations on the stomach the preliminary dose of morphin makes it feasible to decrease the amount

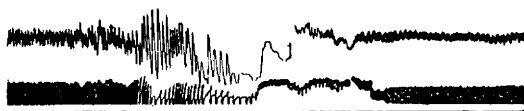


Fig. 17.—No. 217. Inhalation chloroform, automatic. Note primary cardiac and respiratory failure and the effect of prompt artificial respiration by tracheal insufflation. Duration of anesthesia, one hour and four minutes.



Fig. 18.—No. 687. Inhalation chloroform, automatic. Note early cardiac failure and futile efforts at resuscitation.



Fig. 19.—No. 634. Intravenous ether, 5 per cent. First and second thirds of tracing, no anesthesia. Last third shows effects of air entering tube during induction of anesthesia—about 100 c.c. air. No recovery, despite efforts at resuscitation. This indicates the danger of a defective apparatus.

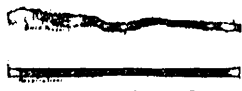


Fig. 20.—No. 683 b. Intravenous ether, 3 per cent. Surgical anesthesia. Tracing shows absence of evil effects when tube to vein is completely severed while solution is flowing.

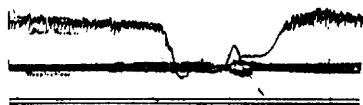


Fig. 21.—No. 665. Local anesthesia. Air-embolism syringe, 60 c.c. air, in fifteen seconds. Spontaneous recovery.

of general anesthetic during the work in the abdominal cavity. Atropin causes and maintains a dry condition of the upper portion of the respiratory tract and is regarded by the anesthetists as very effective when indicated. Generally speaking, however, ether alone is used, the aforesaid drugs being employed only in exceptional cases under special indications.

The object aimed at is to guard against impurities in the anesthetic, to induce anesthesia with the least possible mental and physical disturbance of the patient and to employ the smallest amount of anesthetic consonant with an even surgical anesthesia.

As may be gleaned from an analysis of the records, ether by the drop method, in the hands of skilled anesthetists, indicates the position of the Mayo Clinic on the question of general anesthesia. The present tendency of the clinic is toward amplifying the employment of local anesthetics.

EXPERIMENTAL OBSERVATIONS

During the past three months I have been pursuing experimental investigations on the subject of general anesthesia. The work thus far done is admittedly academic, but designedly presented at this stage not so much for discussion of the indefinite results obtained as for criticism of the procedure as a method of studying and teaching the subject. The object in view is to continue the work at length, investigating the various recognized anesthetics and methods, whatever new may be advanced, studying not only immediate but also remote effects on the organism, and prolonging the work in series sufficiently extensive for deductions of practical value.

One hundred and fifty-three experiments have thus far been undertaken on 145 dogs. The anesthetics

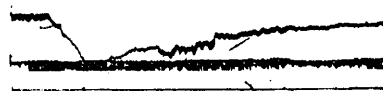


Fig. 22.—No. 408. Intravenous ether, 5 per cent. Note effect of air-embolism—syringe, 100 c.c., air in fractional injections in first part of tracing. Spontaneous recovery. Light anesthesia.



Fig. 23.—No. 649. Intravenous ether, 5 per cent. First part of tracing, local anesthesia. Note induction of anesthesia in first third of tracing, effect of air-embolism, about 60 c.c. slowly, in middle third. Spontaneous recovery, light anesthesia, but sudden cardiac and respiratory failure after a small dose of ether. Unsuccessful efforts at resuscitation.



Fig. 24.—No. 673 b. Intravenous ether. Air-embolism—50 c.c. air in fractional doses, few seconds apart. Compare effect on heart, upper line, with respirations. Spontaneous recovery.



Fig. 25.—No. 646. Intravenous ether, 5 per cent. First part of tracing, local anesthesia. Note early respiratory and later cardiac failure. Efforts at resuscitation successful. Air-embolism, about 70 c.c., slowly injected. Shown in last third of tracing. Spontaneous recovery.

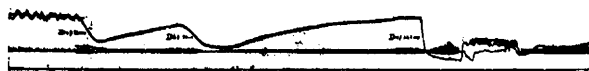


Fig. 26.—No. 637. Intravenous ether, 5 per cent. First part of tracing, local anesthesia. Note cardiac action and respirations during induction of anesthesia. Final third of tracing is a picture resulting from an injection of about 50 c.c. air into femoral vein, tracheal insufflation of air and abdominal pressure. Recovery during light anesthesia.

employed are ether, chloroform, paraldehyd, combined paraldehyd and ether, urethane, and nitrous oxid-oxygen-ether.

The methods of administration used are the intravenous, automatic inhalation, insufflation and rectal. Kymographic records of cardiac action and respirations have been constantly made. Owing to the brevity of the time and the extent of the work, the investigation of some of the anesthetics and methods has been too limited for presentation.

Ether has been administered intravenously 85 times, chloroform 19, paraldehyd 2, and combined paraldehyd and ether 3; by the pulmonary route, ether 27 times, and chloroform 8. Besides these experiments, a series of histologic examinations has been begun for the purpose of studying the effects of the various anesthetics on the tissues of the body. An endeavor will be made to make this work as complete as possible, and sufficiently

extensive for data of value. Although some excellent observations have been reported on this phase of the subject, still it seems that in general attention has been mainly focused on the immediate deleterious effects of anesthetics, somewhat to the neglect of their remote effects on the organism.

In the present limited series the procedure has been to study immediate effects during the induction of anesthesia, the results of overdosing, uneven administration, anesthetics with probable impurities and the efficacy of various methods for resuscitation applied early and late in cardiac and respiratory failure, such as insufflation, abdominal pressure, heart-massage and stimulating drugs injected directly into the circulation. With local anesthesia it has been practicable to obtain normal tracings of cardiac action and respiration for comparison with the various phases of the tracings which followed.

The intravenous method has been employed 109 times. In normal saline solutions the following strengths of

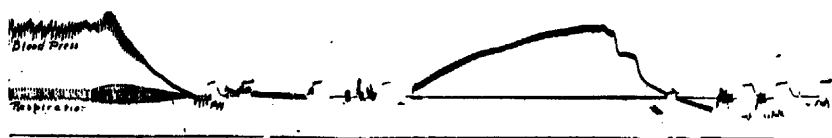


Fig. 27.—No. 678. Intravenous ether, 5 per cent. First part of tracing, local anesthesia. In first third of record note very early cardiac and respiratory failure. In middle third effectual efforts at resuscitation. In last third fatal effect of air-embolism—about 60 c.c. air within twenty seconds. Help ineffective.

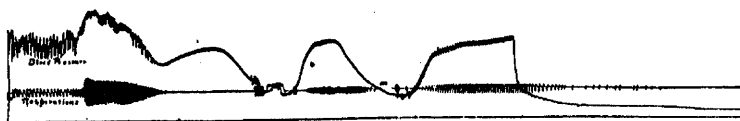


Fig. 28.—No. 674. Intravenous ether, 5 per cent. First part of tracing, no anesthetic. Note primary anesthesia with early respiratory failure and its relation to cardiac failure. Artificial respirations and heart massage; recovery and again failure on adding small amount of ether. Recovery with help. Air-embolism—60 c.c.—syringe. Sudden and fatal cardiac failure. Slight spontaneous efforts at respiration toward end.



Fig. 29.—No. 680. Inhalation ether, automatic. Light anesthesia. Total amount of air injected into femoral vein, about 300 c.c. First drop is effect of 100 c.c. air in twenty seconds, second and third drops, 100 c.c. in fifteen seconds each. Note that respirations are little affected. Recovery, but animal died two days later. Air in heart and quite generally in veins.

anesthetics have been used: ether, 5 and 3 per cent.; chloroform, 2.5 and 1.5 per cent.; paraldehyd, 2 per cent.; ether, 5 per cent., and paraldehyd 1 per cent. Hedonal and other anesthetics will be added to the list in the further progress of the work, and Ringer's solution will replace the saline solution which has been used.

AIR EMBOLISM

The question of air embolism has been studied in association with the experiments on intravenous anesthesia. This has consisted of the injection into the femoral vein of large amounts of air, from about 50 to 100 c.c. at once, and large amounts fractionally. Observations on the effects of air embolism have been made with local, light and deep general anesthesia.

As previously intimated, the results of experimentation will not be discussed at this time. A clearer idea of the plan of the work is better seen depicted on the limited number of the accompanying kymographic records.

ABSTRACT OF DISCUSSION

DR. TORALD SOLLMANN, Cleveland: The paper has helped to confirm some conclusions I had formed on this subject. Any anesthesia is a departure from the normal. For that reason it is impossible to expect that we shall ever find a "fool-proof" anesthetic. The improvements that are needed are in intelligent use. With intelligent use the present anesthetics will suffice to produce relatively safe anesthesia. The safety is proportional to the intelligence with which the anesthetic is administered. For intelligent administration as many positive data as possible are necessary and the present investigation helps to this end.

DR. ALEXANDER S. VON MANSFELDE, Ashland, Neb.: I have perhaps been placed most happily in my work in surgery, for the reason that I had an unusually fine anesthetist, my wife, who gave chloroform for me for thirty years. I never for a moment had to think of my anesthesia when I operated. Three times in my career it has happened to me that my patients came near dying, although only one of them gave me a great deal of work. Some of you who are informed on anesthesia know of the report of the Hyderabad Commission in England. The essence of that great piece of work seems to have been that it was a difference in the temperature, of moisture and warmth, that made the commission endorse chloroform above all other anesthetics. After reading that report carefully, I concluded that I would try out the work of that commission and I made what is called in physics a moteless chamber of my operating-room. I superheated it a short time before the operation and had it intensely moist and let it come down to a temperature of 103 or 104 F. and kept it there. Remarkable as it may appear, I had no shock in severe abdominal operations when the temperature was from 103 to 104 F. I never, under any circumstances, had the bad results which are said to accompany anesthesia, and that was because the anesthetist gave medicinal and not poisonous doses of the chloroform. You cannot conceive the necessities that come to the surgeon as they came

to me in the early history of the state of Nebraska, where I had to be everything and do everything in an operation, many times under conditions and circumstances that you will think abominable. Yet I lost no one from chloroform anesthesia. Now who would be able to go and do a rather

lengthy and severe piece of surgery with absolutely no assistant whatever except the farmer's wife or daughter picked up for the occasion? Who of you would undertake to perform a difficult and lengthy operation with ether with an inexperienced person to give it?

Try it and see what you think of it. With chloroform I could watch the giver; I could not with ether. I would emphasize again the fact that medicinal doses of chloroform are perfectly safe. I removed an ovarian tumor and my wife gave just 2 drams of chloroform during the whole operation. I did the operation in just nineteen minutes. The point I make is that the surroundings of the case are most important. The atmosphere, if it can be brought to the condition of the Hyderabad temperature and climate, will produce the same effect on the use of the chloroform here as it had there. The sum total of it is that someone who knows how should give chloroform in the best possible surroundings and never beyond a medicinal dose.

DR. CLYDE BROOKS, Pittsburgh, Pa.: In regard to the method of giving anesthetics I would speak of a method we used in giving it to animals. I found that valves produced more or less resistance and partial asphyxia.

In the method I have employed there is a cannula inserted into the trachea, with side opening with a rubber connection with a screw-clip for regulating depth of anesthesia. Next there is a side-tube which dips under oil or some such liquid which forms a liquid valve to allow outflow but prevent inflow. Next there is a tube that dips under the ether in the ether bottle and forms a liquid valve which allows inflow, but not outflow. During inspiration the air would flow through the liquid-ether valve, and into the lungs of the dog, whereas during expiration the ether-liquid valve would close and the expired air would flow out through the oil-liquid valve. This offers slight resistance and, in fact, the least resistance of any method that I have employed.

Dr. McGrath alluded to "the Meltzer insufflation method." I would ask whether he was under the impression that Dr. Meltzer originated the essential points in the method employed by Dr. McGrath? Some have maintained that Meltzer's name should not be used to designate the method.

Dr. B. F. McGRATH, Rochester, Minn.: In applying the name "Meltzer" to the method of insufflation, I did not have the question of priority in mind. To say the least, the investigations of Meltzer and Auer have added a stimulus to and amplified the application of this principle.

THE RELATION OF POLITICS TO THE STATE CARE OF CRIPPLED AND DEFORMED *

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It affords me much pleasure to read, in Minnesota, a paper on the relation of politics to the state care of the crippled and deformed, for it was the first of the United States to provide state care for these patients. The whole modern movement, which has for its motive the prevention of dependency, finds no better expression than along the line which aims to convert deformed or crippled children into independent and self-supporting persons. Many of the physical infirmities which these patients have are not susceptible of complete cure, but a considerable majority of all persons so affected may, by suitable surgical and mechanical treatment and by especially adapted methods of education, be rendered capable of self-support.

There are many reasons why the care and education of crippled children is naturally a state function. It has long been considered that the education and training of normal persons is a profitable thing for cities and states to do, but it is certain that a much larger proportion of those who are crippled become dependent if not made the object of special care. Economically therefore the state is simply using ordinary business foresight if by suitable hospital care and education these patients are treated and trained so as to become partially or wholly independent and self-supporting.

It has long been recognized that special institutions are necessary both for the hospital care of crippled children and for the education of those who are defective either physically or mentally. To me it has seemed for a long time that the combination into one institution of the hospital and school for crippled children is of special importance. We have found in the Nebraska Orthopedic Hospital that considerable progress educationally may be made by these patients while actually under treatment. Moreover, a continuation of their educational training and the selection of occupa-

tions for them is probably more successfully done under the supervision of those who have administered their hospital care and who have a full appreciation of the physical and mental needs and qualifications of these patients.

The question has frequently been raised in Nebraska and elsewhere as to the propriety of having the affairs of an institution of this character administered by politicians. After eight years of experience in a state institution, during which time our appropriations have been obtained directly from the state legislature, our affairs ordered by legislative committees, and administered by state officers, it may be well to give some public expression of the manner of origin and development of this important work.

In the Nebraska legislature of 1904 a few persons (not more than six or eight), including Mr. J. H. Casebeer, who was a member of the legislature at that time, prepared and had introduced a measure providing for an appropriation of \$25,000 to establish and maintain for two years an institution for the hospital care and education of the crippled and deformed. This original bill was modeled after the Minnesota law, except that the institution was placed in the custody of the board of lands and buildings instead of under the regents of the university. The Nebraska bill contemplated, however, that as in Minnesota, the matter of the appointment of officers should be in the hands of a board rather than that it should be left to the governor alone. The Orthopedic Hospital was the first institution in Nebraska for which this provision was made. Practically every member of the legislature of 1904 was duly presented with arguments in favor of inaugurating this work, and eventually the bill passed both branches of the legislature practically without opposition except that the amount of the appropriation was reduced from \$25,000 to \$10,000. On the presentation of the bill to the governor for his signature, however, the question was raised as to the actual necessity for such an institution. Governor Mickey expressed the belief that the number of patients actually in need of such care in Nebraska must be very small. A comparative estimate based on the number of cripples in other localities led to the conclusion that there must be as many as twelve or fifteen hundred in Nebraska. The final argument which induced Governor Mickey to sign the bill, however, was the collection by Mr. John Davis, then secretary of the board of charities, of information regarding about seventy-five cripples who were at that time objects of public care at county poor-farms or otherwise. On this showing being made, Governor Mickey signed the bill and it became a law.

The Nebraska Orthopedic Hospital was opened for the reception of patients Oct. 1, 1905, and our first official biennium closed Nov. 30, 1906. During the fourteen months 108 patients had been received at the institution. The next legislature, before whom an accurate showing was made, not only of the work already accomplished, but of the patients then in the institution and of other candidates for admission for whom no facilities had been provided, responded at once with an emergency appropriation for immediate use and with a much larger appropriation for the succeeding biennium, the total amount being in the neighborhood of \$50,000. Of this amount about \$20,000 was spent in remodeling our building so that it became much more satisfactory for hospital purposes.

During a period comprising nearly four years, the experiment of caring for the crippled children of

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