ANAESTHESIA FOR THE PATIENT IN SHOCK

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The principles of anaesthesia are the same in war as in peace, and likewise a thorough knowledge of the pathology and treatment of shock is a necessary adjunct under both conditions. The condition of patients in shock is clinically deceptive, and this knowledge is necessary for a correct opinion as to the optimum time for operation, the extent to which it should be limited, and the supportive measures necessary during the surgical procedure. This knowledge will make the anaesthetist realise that one of the most important consequences of shock, and the one which will most affect his choice of agent and technique, is the anoxia to which the body is subjected. In my opinion, the chief duty of the anaesthetist in this type of case is to avoid any agent or technique which might enhance this anoxia.

Shock

Shock is a condition by no means easy to define, but its manifestations are well known. They include pallor, thirst, vomiting, perspiration, oliguria, a rapid, weak pulse, and declining systolic and pulse pressure. The superficial veins are collapsed, the minute veins in the sclera are congested in contrast to the pallor of the skin and mucosa, and the peripheral parts of the body become cold. The basal metabolic rate, plasma chlorides and alkali reserve are reduced; the blood potassium, blood sugar and nonprotein nitrates are increased. There is a reduced oxygen content of the blood, delayed coagulation, and marked concentration of the red cells (1).

Moon (2) has shown how these changes are brought about. Under the influence of shock there occurs widespread capillary dilatation and atony, and a decrease in flow and volume of the blood: i.e. the circulatory system is greatly increased in volume while the total volume of blood within it is decreased. This condition decreases the delivery of oxygen to the tissues and causes a generalised anoxia which retards all metabolic processes and produces in its turn a further relaxation of the capillary walls. The anoxia also affects the integrity of the endothelial lining of the capillaries so that plasma is allowed to leak through them, and the blood becomes abnormally concentrated and viscid (3). The minute vessels become filled with corpuscles and the circulation becomes

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sluggish and eventually stagnates. Thus when the lack of oxygen in any large area of tissue is sufficient to produce capillary dilatation, the condition tends to become self-perpetuating. The oedema and reduction of circulation in the lungs may develop into terminal pneumonia. Thus the dominating features of shock are: progressive circulatory deficiency, haemoconcentration and generalised anoxia.

Compensatory Mechanism

The body attempts to compensate for these effects if the shock is not too profound. The volume of the blood is restored by a discharge of blood from the spleen and by absorption of fluid from the tissues (which become dehydrated) and the gastro-intestinal tract, while the capacity of the circulatory system is reduced by constriction of the vessels and contraction in size of the heart (4). The peripheral veins may become so collapsed that venipuncture is impossible, while the arteries may be so constricted that the pulse becomes weak and the skin pale and cold. These compensatory mechanisms may succeed in restoring the systolic blood pressure level and in maintaining the flow of blood to the brain and vital organs, but the flow of blood is reduced to a fraction of the normal and the profound anoxia from which the tissues are suffering remains unrelieved.

Blood Pressure in Shock

A fall of blood pressure, therefore, is not an essential feature of shock, for the latter may be present while the arterial pressure is well maintained (5, 6). Grant (7) found that in young persons the compensatory vasoconstriction may be so effective as to produce a high blood pressure value although the pulse is imperceptible and the patient is obviously in a profound degree of shock. Hypertensive patients may show a blood pressure reading which, although low for them, is still within normal limits. A normal pulse rate and arterial pressure and even a good facial colour are compatible with severe injury and loss of blood. So long as compensation is effective there will be no marked fall in arterial pressure. To delay treatment until the latter occurs, or to rush the patient into the operating room because it has not occurred, will gravely prejudice any chance of recovery.

A period of observation before operation is therefore essential, and only in very exceptional circumstances should patients be rushed to operation without it. A review of a large series of cases by Kekwick and his colleagues (8) showed the value of such a period of observation during which readings of blood pressure are taken every fifteen minutes. This method is more reliable than observation of the pulse-rate, for the latter may be raised or lowered and may not increase as the blood pressure falls.

HAEMOCONCENTRATION

Haemoconcentration is one of the earliest signs of shock. The degree of shock is proportional to the increase of erythrocytes, the increase in concentration of haemoglobin, the increased specific gravity of the blood, and the increase in volume of the erythrocytes. The first is the simplest method and if available should never be omitted. Allowance must be made for the effects of haemorrhage, which, by reducing the number of red cells, may mask the effect. Moon (9) stated that a rise in the erythrocyte count from 5,000,000 to 6,000,000 represents a haemoconcentration of 20 per cent and is an infallible sign of the presence of shock, even in the absence of any other evidence of circulatory deficiency. A concentration of 40 per cent is a grave sign and is usually accompanied by a fall in blood pressure, while a concentration of over 40 per cent leads to a grave prognosis.

ESTIMATION OF THE ANAESTHETIC RISK

A general examination of the patient should be carried out whenever possible in an attempt to ascertain the extent of injury, the amount of blood and fluid lost, and the degree of cardiac and renal insufficiency. The colour, moisture, and temperature of the peripheral parts of the skin should be noted; and the rate, regularity, and depth of respiration should be observed. The general appearance of the patient is of importance, particularly as to the state of nutrition, obesity, nervous instability, and evidence of excessive smoking or indulgence in alcohol. Age is of prognostic importance, for Miller (10) stated that the mortality was eight times as great in patients over 50 as in patients below this age.

I have found the classification of physical states of the American Society of Anesthetists, Inc. (11) both useful and convenient. Scarcely any of these cases will be included under his Class 1. Class 2 will include patients in mild shock whose blood pressure is above 100 systolic and who show no haemoconcentration. Class 3 will include cases of moderate shock with a blood pressure between 90 and 60 systolic, and haemoconcentration up to 20 per cent. Class 4 will include cases of severe shock, with a systolic pressure below 60 and a haemoconcentration above 30 per cent.

Classification of the patient will also be affected by his reaction to treatment and may have to be revised during the period of preoperative observation. Such classification is no mere academic exercise: it is not only essential for proper treatment and choice of anaesthetic, but it is the only means by which postoperative results may be compared and progress in anaesthesia made. A proper system of recording also is essential, and I have found that the method described by Nosworthy (12) is comprehensive and the simplest I have yet seen.

RESUSCITATION

Brittain and his colleagues (13) as a result of their experience with air-raid casualties in London, formed the opinion that "in few cases only does early operation save life. Adequate resuscitation is imperative, and a period of observation before operation essential." My own experience accords with theirs, and I would add that induction should never be begun while shock is present.

To be effective, treatment must be begun before the condition of shock becomes irreversible and must aim at correcting the blood concentration, preventing further loss of blood or fluid, restoring the volume of the blood and maintaining adequate oxygenation. A few brief notes on the main methods of treatment follow.

1. *Absolute rest* in the "head down" position. The amount of morphia given for relief of pain must not be excessive since this will result in respiratory depression which will increase the anoxaemia and render induction and maintenance of anaesthesia more difficult. Some of the casualties of the London air raids were found to be suffering from actual overdose of morphia.

2. *Warmth.* This again must not be excessive or it may induce perspiration and dilatation of the vessels of the skin, and thereby loss of heat.

3. *Simple surgical measures* such as dusting of the wounds with sulphanilamide powder, splinting of fractures, arrest of haemorrhage or simple dressings.

4. *Intravenous therapy.* In cases of marked loss of blood, when the number of erythrocytes is small, the plasma protein is normal and the capacity of the blood to carry oxygen is reduced, whole blood will be required. In cases of burns, peritonitis, or shock without much loss of blood, where there is haemoconcentration and loss of protein and fluid with diminished circulation, plasma or serum in great quantities is required. In these cases, whole blood increases the concentration and viscosity of the blood, but may be given if plasma is not available. In cases of acute dehydration from reduced intake of fluid, in which there is increased cell volume and plasma protein, administration of hypertonic saline solution is necessary (14).

The rate of infusion must be carefully adjusted. The first 2 pints may be given over three-quarters of an hour, but subsequently at drip rate: one pint each three or four hours. As a rule at least 3 or 4 pints will be needed, and if possible every third pint should be whole blood. A rise of 10 to 20 mm. of mercury in systolic pressure may be expected after each pint of blood or plasma transfused, and many pints may be required before the pressure is restored to a level reasonable for operation. Serial readings of blood pressure should be taken throughout this period, and operation should be postponed until the pressure is satisfactory. Should resuscitation not result in improvement, operation may have to be postponed indefinitely and the prognosis is grave.

When veins are collapsed, venipuncture with a large gauge needle may prove impossible. In such cases Lundy (15) has suggested that it may prove possible to insert a small needle into a small vein at the back of the hand or wrist, and through this to run saline solution as rapidly as the capacity of the needle will allow. A tourniquet is placed around the arm above the elbow until the veins are distended, when venipuncture with a larger needle at the elbow may be successful.

OXYGEN

In cases of shock the whole body suffers from a deficiency of oxygen. There is much evidence, theoretical and clinical (16, 17), that administration of 100 per cent oxygen, combined with restoration of the ability of the blood to carry oxygen, is a potent factor in the treatment of shock. The inhalation of oxygen should be begun as soon as the patient comes under observation, and should be continued throughout the postoperative period. Many lives may be saved by this simple measure. In our cases it has usually been administered either by nasopharyngeal insufflation or by means of a nasal or oronasal "B.L.B." mask. In either case the oxygen is humidified by being passed through a water bottle.

RESULTS OF TREATMENT

In general the results of treatment will be apparent by a constant increase in the systolic pressure, restoration of blood volume and normal concentration of erythrocytes, restoration of colour and warmth to the skin, cessation of sweating, and by return of normal rate and rhythm to pulse and respiration. Once the patient is in a fit state for operation, the sooner it is begun and the quicker it is completed the better. Elaborate surgical techniques and an aesthetically perfect operation may have to be sacrificed, the intervention being restricted to the minimum necessary to deal with the emergency. Gentleness of handling and strict haemostasis must be combined with speed. The patient's condition generally deteriorates during operation and it is usually advisable to continue the estimations of blood pressure as well as the transfusions. After the operation, gentle handling of the patient is essential, and hospital porters must be well instructed and trained. It is a great advantage if the theatre trolleys are so arranged that the head-down position can be maintained and the administration of oxygen continued during transport to the ward.

SELECTION OF ANAESTHETIC AGENT AND TECHNIQUE

The agent must provide good operating conditions for the surgeon; it must be potent and capable of being administered in an atmosphere rich in oxygen; it must provide rapid induction and recovery without excitement; it must be easily controllable, so that the depth of anaesthesia may be continually adjusted to the requirements of the surgeon;

it must not increase the loss of heat or fluids; it should not require complicated apparatus, and it should be safe in inexperienced hands. Since, as Brown (18) and Macintosh (19, 20) have pointed out, patients in shock often require relatively little anaesthetic, great care must be taken to avoid overdose.

A swift and tranquil induction is essential to smooth anaesthesia, for excitement not only upsets the respiratory rhythm and renders it more difficult to maintain a level plane, but it contributes to postoperative restlessness and shock.

Macintosh (19) has pointed out the importance to the non-expert in gaining experience of the intratracheal technique. It is essential for operations about the head and neck, and the importance of a free air-way cannot be over-estimated. Intubation enables the anaesthetist to supervise more than one table (a practice which is not recommended), it enables deep anaesthesia to be obtained readily when required, and it facilitates artificial respiration should this become necessary.

The closed carbon dioxide absorption technique has advantages in many cases. It reduces loss of heat and fluid, prevents accumulation of carbon dioxide and permits great control over respiration. Success with this technique requires constant practice, but the beginner will be well repaid for his trouble.

Nitrous Oxide and Oxygen

This agent is often preferred to all others on the ground that it is the safest anaesthetic known. In my opinion, however, this statement is subject to considerable qualification. While quite suitable for many operations, nitrous oxide, being the weakest of all the anaesthetic drugs, is rather an agent for the production of unconsciousness than one which can produce muscular relaxation. The attempt to produce the former in many resistant patients, and the production of the latter in all cases, is usually accompanied by a degree of anoxemia that often may be dangerous. There is no doubt that, in the majority of cases this agent involves a reduction in inspired oxygen. Thus Clement (21) stated that "although nitrous oxide has no action upon the cells and tissues of the body itself, it reaches the tissues more readily and thus restricts the volume of oxygen available for metabolism. Anaesthesia is a result of reducing combustion in the central nervous system." Deep prolonged anaesthesia with nitrous oxide "implies a drastic and continued curtailment of the oxygen supply which greatly augments any degree of anoxaemia that may be present."

Modern teaching of physiology would not subscribe to the view that "the body shows a remarkable tolerance to moderate and even temporary severe degrees of oxygen want" (p. 97). I regard this statement as being contrary to all available experimental and clinical evidence, and consider the chief duty of the anaesthetist to be the avoidance of

oxygen want or its correction if already present. It is important to note that the effects of anoxia may not be immediately apparent. Thus Samson Wright (22) concluded his account of anoxaemia: "a slight degree of oxygen lack may therefore act insidiously and only reveal its presence after a long latent period. . . . Following prolonged severe exposure to oxygen lack very formidable after effects may occur." Haldane (23) remarked that "Anoxaemia not only stops the machine but wrecks the machinery." Armstrong (24) has pointed out that the effects of anoxia may be insidious or delayed. Courville (25, 26) has also produced evidence of the damaging effect which oxygen deficiency during anaesthesia may produce on the central nervous system—particularly on the cortex—and has shown how minor degrees of anoxaemia may cause permanent damage which may not become apparent until after a considerable latent period. Indeed, as Pask (27) says: "Apparent recovery from a period of anoxia does not necessarily mean that a patient, particularly a shocked one, has not suffered harm from the event."

Waters (28) has stressed the importance of maintaining the integrity of the system for transporting oxygen, of ensuring a free airway and adequate tidal exchange—by mechanical means if necessary. These efforts are of little use if the actual oxygen concentration of the inspired atmosphere is reduced, as is so often necessary to produce anaesthesia with nitrous oxide. There is no doubt that Clement (21) is correct when he stated (p. 40) that "the abnormalities [of respiration] occurring in the deeper planes [of nitrous oxide-oxygen anaesthesia] are all evidences of oxygen want," and that "the symptoms produced in the nervous system by nitrous oxide-oxygen administration are in reality those of a gradually progressing state of anoxaemia." There is indeed some evidence that even when 20 per cent oxygen is administered with nitrous oxide, lowered oxygenation of the blood occurs, for Smith (29, 30) found that under these conditions in obstetric cases the blood was only 75 per cent saturated.

In my view many of the "toxic effects" previously ascribed to anaesthetic agents are in reality due to anoxaemia associated with the technique of administration. Modern teaching of physiology stresses the importance of correcting any anoxia from which the patient may be suffering, and of avoiding the use of any agent or technique which might intensify this anoxia.

The subject of asphyxia in nitrous oxide-oxygen anaesthesia cannot be left without considering the meaning of cyanosis. Clement (21) (p. 38) stated that "the difference between the cyanosis associated with nitrous oxide-oxygen, and that with other anaesthetic agents has been too frequently overlooked. . . . The presence of cyanosis in nitrous oxide-oxygen anaesthesia should not be given the same significance as with all other anaesthetics." In my opinion, experience does not support this statement.

Cyanosis depends on the absolute amount of reduced haemoglobin present in the blood, the amount of oxygenated haemoglobin present being of little importance in its production (31). Thus, in full-blooded plethoric individuals even at rest there may be an amount of reduced haemoglobin in the blood sufficient to produce cyanosis, but, since the total haemoglobin is above normal, there is sufficient oxygenated haemoglobin to satisfy oxygen requirements. In other words, in this type of individual alone cyanosis may exist without anoxaemia; and its significance, during anaesthesia with nitrous oxide or any other agent is negligible. Such patients, however, form a very small proportion of those coming to operation, and consequently the possibility of cyanosis without anoxaemia may be ignored.

Far different, however, is the case with anaemic patients. In such cases, since the total amount of haemoglobin in the blood is decreased the amount available to produce cyanosis is reduced if total oxygen requirements are to be met. In the extreme case, to quote Clement, "it is in fact impossible to render cyanotic a patient having 30 per cent haemoglobin or less . . . thus an anaemic patient may never become cyanotic, even when a failing blood pressure, failing pulse, and rapid inefficient respirations indicate the presence of grave anoxaemia" (p. 105). No surgeon would operate on a patient whose haemoglobin had been reduced to this level. However, in anaemic patients generally, since the oxygen carrying capacity of the blood is reduced, there may be some degree of anoxaemia even when the blood is fully oxygenated, although insufficient reduced haemoglobin is present in the capillaries to produce cyanosis. But when the latter is present, the amount of haemoglobin available for carrying oxygen is further reduced, and oxygen want is intensified. In anaemic patients, therefore, anoxaemia may be present without cyanosis, but if cyanosis is present, anoxaemia may be presumed with certainty. This is important since a large number of patients who come to operation are either anaemic or become so during the operation.

"The inexperienced anaesthetist may have difficulty in deciding whether cyanosis in a given case means merely an amount of oxygen insufficient to saturate the haemoglobin of the blood, or whether it is associated with true signs of anoxaemia" (Clement, p. 106). It would appear to me that the only method of deciding this is by determination of the metabolic rate, from which the oxygen demand might be calculated, or by determining the alveolar tension of oxygen, the hydrogen ion concentration of the blood, and the haemoglobin concentration.

McCarthy (32) has recently described signs by which he considers true anoxaemia may be recognized. These signs include irregular respirations, with "Cheyne-Stokes" periodic breathing and prolonged gasping respirations, a rapid pulse rate above 100, blood pressure level falling below 100 mm. systolic with a corresponding fall in pulse pressure. Although these signs may be caused by anoxaemia, they are at

ways late signs. They are evidence that the circulatory and respiratory systems are already profoundly depressed. Should their presence be awaited before anoxaemia is diagnosed, irreparable damage may be caused. Moreover, the value of these signs, even when present, is difficult to assess for they may be due to other causes, such as overdose of preliminary or anaesthetic drugs, or the effects of surgical trauma or stimulation.

Fortunately it is never necessary to await the development of these late signs, for there is a much more delicate criterion available to us, the haemoglobin concentration. When this is reduced, either before or during operation, as it is in nearly every surgical case, cyanosis must not only be avoided at all cost and the blood be kept oxygenated throughout, but an increased concentration of oxygen must be given, over and above that necessary to produce oxygenated blood, in order to compensate for reduced haemoglobin. Unless this practice is invariably followed, the anaesthetist cannot be certain that he is not producing anoxaemia.

Unfortunately, with nitrous oxide "it is impossible to produce narcosis in the majority of patients and still maintain a pink skin and scarlet blood" (21, p. 103). Since this is the case I submit that this anaesthetic should not be given to patients in severe shock.

Ether

In my view the safest agent, for experienced and inexperienced anaesthetists alike, is ether. Its value has been proved in nearly 100 years of continuous use during which many million operations must have been performed. It is the agent with which we have the most experience, which has the widest margin of safety, which has been most carefully investigated both in the laboratory and under clinical conditions. It may not be the best agent for a particular case, but its relative advantages and disadvantages are well known, and the accumulated experience of the past century enables us to know the conditions under which it can be used with a minimum of untoward effects.

There is ample evidence of the effects of ether on the cells, the circulatory system, the physiologic function of the liver and kidneys and of the chemical changes which it induces. These changes, however, unlike those brought about by anoxaemia, are reversible. Whereas the anoxaemia which accompanies nitrous oxide-oxygen anaesthesia cannot always be avoided, that which may be deliberately induced with ether and to which many of the untoward effects of this agent are due, is quite unnecessary for its effective action. They can, and should be, avoided.

Some physicians believe that ether irritates the alveolar mucosa, and thus leads to postoperative pulmonary complications. This may occur if the vapour administered to the patient is saturated with ether at a temperature much higher than that of the body, when the cooling of the

vapour in the lungs might cause condensation of ether in liquid drops. Apart from this there is no evidence that ether is an etiologic factor in postoperative respiratory complications, which are more likely to be due to anoxaemia caused by the anaesthetist; lack of gentleness or haemostasis on the part of the surgeon; shock, however caused; excessive postoperative depression; or preëxisting respiratory infection. Analysis of a large series of cases (33, 34) has shown that these complications occur independently of the anaesthetic, and are just as frequent after spinal or local analgesia. The irritating nature of ether vapour does, however, make it difficult to resort to it, or to deepen anaesthesia suddenly in the middle of an operation without causing some disturbance to the patient or annoyance to the surgeon. This is not an insuperable objection, for it may be avoided by judicious management.

The occurrence of "ether convulsions" provides a more serious objection. I am not, however, convinced of the part which ether may play in their causation, for they have occurred with other agents. In many cases some definite error in technique, such as allowing the accumulation of carbon dioxide or not providing sufficient oxygen, has been committed. Fortunately the incidence of ether convulsions is small, and although they must be considered seriously I submit that there is insufficient evidence to condemn ether on this account.

Ether is one of the most potent, as well as one of the safest, anaesthetics known to us. In England "ether, first used as an anaesthetic agent one hundred years ago, is still the safest and most popular anaesthetic for general use" (35). According to Kaye (36) it is the most frequently used agent in Australia, while at the Mayo Clinic in 1942 it was administered to no less than 30 per cent of all surgical cases (37), so that apparently, in spite of the competition of newer agents, it is still extensively used in the U. S. A. Indeed, Beecher (38) pleads for its more extensive use in preference to newer agents, for after administering it to 147 patients with pulmonary tuberculosis, some of them seriously ill he concluded: "In our opinion the anesthetic agent is not important in these cases so long as it permits the use of a plentiful supply of oxygen and allows the surgeon to carry out a deliberate, unhampered and unhurried operation." Finally, Grant and Reeve (39) reviewing their experience of operations in air-raid casualties concluded: "From what we have seen the gas-oxygen-ether mixture well administered is a safe and satisfactory anaesthetic."

A well-given ether anaesthesia involves:

1. Smooth induction and maintenance. This can be more easily achieved if ether is volatilized by nitrous oxide-oxygen in a machine than if it is dropped on an open mask. The nitrous-oxide-ether sequence allows more rapid induction with less coughing, salivation, and excitement. The part which the nitrous oxide may play in both light and deep planes of such an anaesthesia is a subject on which diverse views are expressed, but I suspect that it is of more importance than is often

realised. I do not agree that "by the addition of ether to the mixture the benefits of gas-oxygen alone are largely sacrificed" (21, p. 103); but believe in the principle advanced by Lundy (40) of the use of a combination of agents and methods to decrease the toxicity of a single agent as being a more rational practice. The benefits conferred on the patient by adding ether to a gas-oxygen mixture, thereby enabling anaesthesia to be maintained without the risk of anoxaemia, is far greater than any possible disadvantage due to the toxicity of the added ether. In the words of Gwathmey (41) "nitrous oxide and ether, with enough oxygen to prevent cyanosis, is the safest anaesthetic, both as to life and after effects."

2. Avoidance of excessive loss of heat due to the administration of cold vapour (42, 33).

3. Prevention of excessive accumulation of carbon dioxide.

Pentothal Sodium

One is both impressed and concerned by the extent to which intravenous anaesthesia is being employed for military casualties. Leech (43) reported that, of the many serious casualties resulting from the Dieppe raid, 51 per cent received pentothal anaesthesia; Muir and Porritt (44) stated that three-quarters of the casualties in the Middle East received the same anaesthetic. On the other hand, reports from Pearl Harbor (45) showed that this method is not without its dangers.

The dangers of pentothal are the ease with which an overdose can be given, the difficulty of resuscitation, the respiratory depression, and the circulatory failure which may ensue in susceptible cases. There is great variation in individual susceptibility with this as with all barbiturates, and it must be used with caution.

Among the precautions which must be taken are the use of a dilute solution (I find that a 2.5 per cent is the most convenient); very slow injection through a narrow-bore needle; maintenance of a good airway, a nasopharyngeal tube being convenient; the administration of either oxygen or equal parts of nitrous oxide and oxygen (which enables a smoother anaesthesia to be maintained with the use of less pentothal); and continuous observation of the pulse, respirations, and blood pressure. Great care must be taken to avoid injection into an artery, since this may be followed by gangrene of the hand. Until we have more experience with this drug it should be used only by experienced anaesthetists in selected cases.

SUMMARY

1. The general principles of anaesthesia in badly wounded casualties are reviewed.

2. The importance of the adequate treatment of shock is stressed.

3. The principles which should guide the selection of anaesthetic agent and technique are discussed.

4. The use of nitrous oxide-oxygen alone is criticized on the ground of the inevitable associated anoxaemia.

5. The use of ether alone, or as a supplement to nitrous oxide-oxygen is recommended.

6. Safety depends on the skill and experience of the administrator. One of the most important of his functions is the prevention and treatment of anoxaemia.

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MEETING OF THE AMERICAN SOCIETY OF ANESTHETISTS, INC.

NEW YORK ACADEMY OF MEDICINE

Fifth Avenue at 102nd Street, New York City

April 13, 1944—8:00 P.M.

The program for this meeting in New York is as yet incomplete. The principal speaker will be M. L. Tainter, M.D., Director of Research, Winthrop Chemical Company, who will speak for 40 minutes on "The Composition of Local Anesthetic Solutions." The discussion of Doctor Tainter's paper will be opened by R. Beutner, M.D., Professor of Pharmacology, Hahnemann Medical College and Hospital, Philadelphia, Pa. Following there will be one or two short case reports. In addition, Kenneth M. Heard, M.D., Toronto, Canada, will speak informally on "The Relationship of Organized Anesthesia to the Proposed Canadian Health Bill."