

## PREOPERATIVE PREPARATION AND CHOICE OF ANESTHETIC AGENTS \*

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Received for publication October 20, 1949

ADEQUATE preoperative preparation of surgical patients is today recognized as one of the fundamental principles to be observed carefully if morbidity and mortality are to be kept to a minimum. A well-planned program of intelligent preoperative preparation is dependent upon adequate laboratory reports and careful histories and physical examinations.

Patients who are victims of cardiac disease or debilitating diseases such as severe chronic osteomyelitis, suppurative diseases within the pleural cavities and lungs, extensive neoplastic disease, severe metabolic disease, intestinal obstruction and asthma, deserve the benefit of special consideration and individual attention. The results obtained in the surgical treatment of such patients are largely dependent upon successful preoperative correction of circulatory, metabolic and dietary deficiencies.

### CARDIAC DISEASE

The anesthetic management of cardiac patients is usually the cause of grave concern but experience has taught us that the majority of these patients tolerate surgical procedures well. Many formulas have been suggested for evaluating cardiac reserve. However, those of us who have had the opportunity of seeing many of these cases have learned that most patients with heart disease, who can carry out nearly normal physical activity without dyspnea or precordial pain and who do not have pretibial edema or rales in the bases of the lungs, are fairly good risks for anesthesia and surgery. On the other hand, decompensated cardiacs must be prepared for operation with bed rest, digitalization and restriction of the sodium ion. Overloading of the circulatory system with intravenous fluids during or after operation is hazardous. Replacement therapy must be carefully planned so that the blood volume is not increased above a normal level at any time. The patient with coronary disease or aortic heart disease must be protected from sudden lowering of the blood pressure because of the dangers of coronary occlusion.

\* Presented before the Annual Meeting of the Pennsylvania Society of Anesthesiologists, September 29, 1949.

Stormy inductions are to be avoided. The use of sodium pentothal intravenously as an induction agent, carrying the patient into the first plane of surgical anesthesia before inhalation agents are administered, will assure a quiet induction, free from excitement, struggling and breath-holding. Ether maintenance in a closed system, using a high concentration of oxygen, is almost always well tolerated by these patients.

#### CHRONIC OSTEOMYELITIS

Patients with chronic osteomyelitis are almost always in a state of nutritional deficiency with negative nitrogen balance. While the hematocrit, blood counts and hemoglobin values are frequently normal, it has been found that they have decreased total blood volumes (1). The feeding of diets rich in protein with the use of intravenous preparations of amino acids seldom satisfactorily improves the state of protein deficiency. Multiple transfusions given daily or on alternate days over a period of two weeks will usually correct the condition, restoring normal blood volume and a positive nitrogen balance.

These patients with reduced total blood volumes are actually in a state of chronic shock and will frequently react to spinal anesthesia exactly as an acutely shocked individual responds. Proper restoration of blood volume and normal protein metabolism not only improves wound healing in these individuals but also makes them much better subjects for anesthesia and prolonged surgery.

#### INTESTINAL OBSTRUCTION

Patients with severe intestinal obstruction who have vomited for a prolonged period of time are also in a state of negative nitrogen balance with reduced total blood volumes and usually have a deficiency of chlorides. These patients also are in a state of chronic shock and, in my opinion, should not be operated upon under spinal anesthesia. The state of the patient's blood pressure and pulse when first seen in the hospital is sometimes misleading. It is not unusual for these patients to have blood pressures somewhat below normal but definitely above that which is usually associated with a state of shock. However, the pulse is usually accelerated considerably above the normal. The administration of intravenous fluids such as dextrose, or dextrose in saline, immediately before operation will usually raise the blood pressure slightly. This temporary blood pressure rise following the intravenous administration of electrolytes must not be interpreted as having corrected the deficiency in the total blood volumes. Transfusions of whole blood given before and during operation tend to improve the condition of the circulatory system but will usually not be sufficient to make a spinal anesthetic safe.

Inhalation anesthesia probably is the safest method for use in these patients. The use of an endotracheal catheter with an inflatable cuff will prevent aspiration of gastrointestinal content into the lungs dur-

ing the surgical procedure. Patients with acute intestinal obstruction, without distention or vomiting, may under most circumstances be operated on safely using the spinal technic.

#### SUPPURATIVE DISEASES OF THE PLEURAL CAVITIES AND LUNGS

Patients with severe empyema who are to undergo rib resections with closed drainage may be operated upon with a combination of local anesthesia and small amounts of sodium pentothal or gas. These patients usually do quite well provided anesthesia is kept light enough so that the cough reflex is not diminished. Occasionally operation is performed on the patient with empyema and bronchopleural fistula. In such instances it is wise to use deep inhalation anesthesia and an endotracheal catheter so that the tracheobronchial tree can be aspirated frequently. These patients, almost without exception, need whole blood administered during and after operation.

Patients with lung abscess and bronchiectasis requiring surgical treatment may be anesthetized with most any of the inhalation agents. If ether is used, the bothersome traction reflexes which have so frequently been reported in thoracic surgical patients are almost never observed.

#### METABOLIC DISEASE

Patients with diabetes, Addison's disease, pancreatitis and myasthenia gravis present problems which must be carefully evaluated before an anesthetic agent is administered.

It is my belief that elective surgery should not be done on diabetic patients until the blood sugar has been brought to a level below 150 mg. per 100 cc. of blood, hydration is complete and there is no ketosis. If the diabetes is well controlled perhaps any anesthetic method or agent might be used, although it is probably best to administer only those agents which have little or no effect on carbohydrate metabolism.

The patient with severe diabetes which cannot be controlled or who comes in for emergency surgery without benefit of complete diabetic evaluation, may be anesthetized with cyclopropane, spinal anesthetics or with a combination of one of the weaker gases such as nitrous oxide or ethylene and sodium pentothal. Treatment of the diabetes ought to be instituted before or at the time of operation and continued after operation.

Refrigeration anesthesia for amputation of gangrenous lower extremities in severe diabetics is an acceptable and safe method.

Patients with Addison's disease or myasthenia gravis are also poor risks for anesthesia and surgery. Spinal anesthesia and curare are to be avoided. Pancreatic disease, such as malignancies and cysts, can usually be handled with any anesthetic agent or method.

The patient with hemorrhagic pancreatitis with extensive fat necrosis is an extremely poor risk for anesthesia and surgery. These

patients frequently die during or soon after operation regardless of the type of anesthetic employed. Any patient with an acute abdominal condition in which the diagnosis is obscure should have serum amylase tests in order that operation may be avoided if hemorrhagic pancreatitis exists.

#### NEOPLASTIC DISEASE

The anesthetic management of patients with neoplastic disease should be most carefully planned according to the site of operation and general physical condition. It is my experience that patients undergoing radical resection of the colon do better under a combination of spinal and pentothal anesthesia, with constant administration of oxygen, than when other methods are used.

The patient with upper abdominal lesions and especially those with lesions of the stomach and esophagus, whose resections will be done by the transthoracic approach, usually do well with endotracheal ether-oxygen anesthesia. Malignant lesions about the neck or throat can be resected under regional anesthesia or with inhalation methods. At the George Washington University Hospital most radical resections of the neck are carried out with the use of an electrosurgical unit. In such instances, it has been our policy to use a combination of avertin and pentothal with endotracheal nitrous-oxide and oxygen. By using carefully balanced doses, these patients are maintained in excellent condition for extended periods of time and the recovery period has not been prolonged.

#### ASTHMA

Anesthetists are frequently called upon to assist in the medical management of patients during severe attacks of asthma. These patients are usually epinephrine and aminophylline fast and will not respond to ordinary therapeutic measures. During the past two years we have had the opportunity of sharing in both the medical and surgical care of a great number of these patients. It has been found that most severe attacks of asthma can be broken up by the administration of a conservative dose of avertin given rectally, followed by prolonged ether-oxygen anesthesia. At the termination of anesthesia bronchoscopy is carried out so that all visible secretions can be removed from the tracheobronchial tree. Direct application of 1 to 1000 epinephrine to the edematous areas of the bronchi seems to be of some benefit.

The nursing care of these patients for the first few hours following such therapeutic anesthetics is most important. They must be encouraged to cough up secretions and in some cases prolonged oxygen administration is required.

The use of avertin to overcome bronchial constriction may be dangerous unless conservative doses are used. We have attempted to evaluate all of our patients according to their tolerance to avertin and have not given a dose of this drug which exceeds 80 mg. per kilogram of body weight to any asthmatic patient. The dosage has been as low

as 20 mg. per kilogram of body weight and the average dose has been somewhere between 40 and 60 mg. per kilogram of body weight.

After the avertin is given and has begun to show effect, the patient is removed to the operating room where he is kept under constant observation by physician anesthetists. He is not returned to the nursing service until he has responded completely and has regained all his reflex activity.

The tidal volume of respiration was measured before and following the administration of avertin in a number of asthmatic patients and has been found to be increased. This finding, of course, is not present in those patients with idiopathic emphysema.

It is important to plan carefully for the anesthetic management of asthmatic patients who are to undergo surgical procedures. It is common knowledge that excitement or worry may precipitate an acute attack. Therefore, it is necessary to gain the patient's confidence early and to prevent him from becoming apprehensive during the preoperative period.

Morphine and codeine probably ought to be avoided. If preoperative narcotics are desirable, demerol is satisfactory since it has a slight bronchial dilating effect. Atropine or scopolamine may also be used. The administration of parasympathomimetic drugs, such as curare, pentothal sodium and cyclopropane, is to be avoided for any of these drugs, singly or in combination, may precipitate a severe attack during anesthesia.

Spinal anesthesia is not satisfactory for most severe asthmatic patients. Acute attacks may occur during anesthesia owing to the emotional state of the patient or to the paralyzing effect on the sympathetic nerves of the anesthetic agent as it ascends into the middorsal region.

It has been our policy to use small doses of avertin rectally in the patient's room. This drug, through its sedative and basal anesthetic actions, largely eliminates the possibility of an asthmatic attack caused by emotional upset. It also tends to relax bronchial musculature.

After the patient is in a state of basal narcosis, he is taken to the operating room where gas-oxygen-ether with ether maintenance is administered. Following operation bronchoscopy is performed on all of these patients to remove as much foreign material as possible from the tracheobronchial tree.

During the first two or three postoperative days, these patients cough up large quantities of mucus. It is not clear whether the bronchial dilating effect of ether and avertin is prolonged, allowing the foreign material to be raised, or whether the anesthetic acts as a powerful expectorant. The condition of almost all asthmatic patients is improved for several days following the administration of an avertin-ether anesthetic.

#### REFERENCE

1. Lyons, C.: Penicillin Therapy of Surgical Infections in the U. S. Army, J. A. M. A. 123: 1007-1018 (Dec. 18) 1943.