Choice of Anesthesia for Surgical Hip Pinning in the Aged  
A Report of 250 Cases

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Current medical literature evidences an increasing interest in the problem of surgical treatment of the aged. It necessarily follows that anesthesia management of these patients is an integral part of the picture. Intratrochanteric fracture of the femur is one of the commonest indications for surgical treatment of the aged, and in this article we shall discuss the problems that arise in the management of anesthesia and how we believe they are best met.

The following discussion is based on a series of 250 hip pinnings done at Cincinnati General Hospital in 1950 and 1951. The choice of method was about evenly divided between Neufeld and Smith-Petersen nailings. The age of the patients varied from 60 to 93 years. No deaths occurred either during operation or within the first three postoperative days.

PREOPERATIVE PREPARATION

Many physiologic changes normally accompany senescence, and there is often a discrepancy between the patient’s physiologic and chronologic age. Some persons at age 80 are in better condition, both physically and mentally, than others at age 60. These factors must be considered in the approach to psychologic management, physical evaluation, premedication, and choice of anesthetic agent.

Psychologically speaking, a great number of the patients in this age group must be treated as children. They have had a shocking accident; they have been removed from the security and shelter of their homes and families to the strangeness of the hospital ward; they are in pain and frequently become disoriented and hysterical as a result of this experience. Patients of this type must often be restrained, which, although it is a necessary evil, adds to their distraction. When they are brought to the operating room, the anesthetist can do much to allay their fears by talking to them reassuringly and protecting their modesty as much as possible during the surgical preparation. Too often modesty is disregarded.
by operating room personnel when the patient is senile or disoriented, but its violation is contributory to excitement and distraction preoperatively.

On the other hand, should the patient be well preserved and completely oriented, kindness and understanding on the part of the anesthetist will go far towards maintaining his mental and physical welfare. Fright is a normal reaction to anesthesia and surgery, even in the young, and most patients of advanced age are certain that they will not survive the procedure. Therefore, a few minutes’ time taken by the anesthetist to reassure these patients will be rewarded by ease of induction of anesthesia.

It is not uncommon to find many complicating pathologic conditions upon physical examination of aged patients. Those most frequently encountered are generalized arteriosclerosis, hypertensive cardiovascular disease, cardiac decompensation, auricular fibrillation, heart block, renal and hepatic impairment, emphysema, pneumonia, atelectasis, dehydration and fever, anemia, and emaciation. When these conditions are encountered, an attempt is made to treat them insofar as possible before operation. Obviously, this is not always feasible because of the time element involved. Consequently, the least toxic anesthetic agents must be employed. A precipitous decrease in blood pressure must be avoided, and deep anesthesia should not be used. Also, replacement of blood is necessary as it is lost and should not be deferred until the patient becomes hypotensive.

There are conflicting schools of thought on the subject of premedication for the geriatric patient. However, as is true of patients of all ages, the rules relating to general physical condition, age, sex, and weight should be followed. A few physicians believe that the senescent patient should not receive any premedication. Some favor a minimal dose of a barbiturate plus atropine sulfate. Others lean towards obtaining mild sedation and analgesia by the administration of a short-acting barbiturate an hour and a half before operation and one of the less toxic narcotics with atropine sulfate just prior to the time the patient is taken to the operating room. We adhere to the last view, the dosage being varied according to the condition of the patient. Of the narcotic drugs, our preference is for demerol, in doses of 25-50 mg., because of the fact that it produces maximal sedation and analgesia with minimal side effects, such as nausea, dizziness, respiratory depression, and hypotension. Nembutal or seconal, gr. 3/4, or luminal sodium, gr. 2, are the barbiturates of choice. In some instances of extreme debility and cachexia, chloral hydrate, gr. 15, is substituted for the barbiturate. Atropine sulfate is given for the usual reasons of checking secretions of mucus and inhibiting vagal reflexes.

Choice of Anesthesia

One of the extrinsic factors that influence the choice of anesthesia for hip pinning is the explosion hazard. Since the roentgen apparatus must be used frequently throughout the procedure to determine the direction of the nail, explosions from electric sparks are an ever present danger. Unfortunately, many of the portable
roentgen machines that are used are old and not checked so thoroughly as they should be for proper grounding and wiring. Moreover, many operating rooms are not equipped with safety outlets for electric equipment, and there is no way to control humidity to help prevent static sparks. For these reasons anesthetic agents with a low explosive range are desirable. This would automatically eliminate ethylene, cyclopropane, and gas-oxygen-ether mixtures. Local, regional, and intravenous technics are therefore the methods of choice if the explosion hazard is going to be the determining factor in the choice of anesthesia. However, we have not been able to obtain satisfactory results with the use of infiltration anesthesia or intravenous agents alone. For the extremely poor risk patient local infiltration is obviously the only safe method that can be used. It has been our experience, however, that this is unsatisfactory for the surgeon, because of the fact that many of these patients are very unco-operative. Also, since the procedure usually lasts between two and three hours, and since the Bell table must be used, it is a painful ordeal for these old people to have to lie on a hard table with both legs in traction for such a long time. For these reasons local anesthesia is rarely ever used as the sole agent in this hospital.

Several years ago we, of necessity, used pentothal sodium intravenously plus nitrous oxide and oxygen in a 50-50 per cent proportion for all hip pinnings because it was the surgeon’s choice at that time. Our results were not satisfactory for several reasons. Patients in this age group absorb and detoxicate very slowly barbiturates administered intravenously. Over a two or three hour period it was necessary to administer approximately 1.5 Gm. pentothal sodium to obtain adequate anesthesia for the procedure. If more than this amount was needed, we would switch to another inhalation agent. However, even with this limitation of dosage these old people would not respond well at the end of the procedure and frequently required the use of analeptic drugs to restore their reflexes. Then, when they were taken back to the ward, they would lapse back into sleep. With adequate nursing care this would not present much of a problem, but left undisturbed during the immediate postoperative period many of these patients would develop hypostatic pneumonia. Another complication of intravenous anesthesia was the incidence of hypotension during the procedure, which necessitated either excessive use of vasopressor drugs or intravenous administration of fluids. It is well known that elderly people, many of whom normally have hypertension and arteriosclerosis, cannot tolerate changes in blood pressure, such as those induced by the intravenous administration of barbiturates, without coincident shock during an operation. In this type of patient shock may prove irreversible, because of the sluggish response to the usual therapeutic measures. For these reasons we have concluded that intravenous anesthesia is not a good choice for the geriatric patient. In making an over-all choice of anesthesia and method we have selected the following technic as the one with which we have obtained satisfactory results.
If the patient has pulmonary disease or fever before operation, he is given a unilateral spinal nerve block. The drug of choice is procaine, approximately 100 mg. with epinephrine added. The spinal puncture is made while the patient lies on his affected side, and he is left in that position with several pillows under his head and shoulders to allow for fixation time and to prevent too high a level of anesthesia.

This technic has worked satisfactorily, but because of the patient's apprehension, difficulties in positioning, and painful stimuli we have reserved this method for patients not able to tolerate inhalation anesthesia.

Of the 250 patients in this series, 95 were given spinal anesthesia and the rest were anesthetized by the method we shall now describe.

If the patient arrives in the operating room with a severe decrease in blood pressure, or if he has respiratory depression after the administration of premedication, the intravenous administration of a barbiturate for induction of anesthesia is not carried out. If the patient's blood pressure is fairly stable, he is given small amounts of pentothal sodium to carry him past the excitement stage. This is given to him in bed before the traction is removed in order to eliminate discomfort and pain. Ether by the drop method is given slowly to prevent coughing and spasm, and the intravenous administration of pentothal sodium is continued to maintain a satisfactory level of anesthesia. Once the anesthesia is maintained in the first plane, the administration of pentothal sodium is discontinued, and the patient is moved to the table for reduction of the fracture and pinning. For the administration of ether a Yankauer mask with an oxygen adapter is used, and if this is not available, an oxygen tube is placed under the mask. An oxygen carrier, with a liter gage and humidifier permitting the insufflation of about 1 L. per minute, is preferred.

If we see the patient is requiring large amounts of ether to maintain stage III, plane one anesthesia, it is our practice to repeat the administration of small doses of demerol, usually 25 mg., half of which is given intravenously and half subcutaneously.

Supportive Therapy

The intravenous infusion of 5 per cent glucose in distilled water, through a large gage needle in an arm vein, is routinely started at the beginning of the procedure after induction of anesthesia. The flow is kept at a slow rate to avoid overloading the venous system. An attempt is made to replace blood as it is lost rather than wait until impending shock is manifest. In this series the average amount of blood required was 500 cc. Occasionally, the anemic or cachectic patient required more.

Should the patient's airway become obstructed or should he have poor tidal exchange, a pharyngeal airway is used, and if the condition persists, an intratracheal tube is inserted and the anesthesia maintained with oxygen and ether administered with the gas machine.

Hypotension and changes in pulse rate and volume are common in this type of patient regardless of the method of anesthesia. We confine the use of vasopressor drugs to the correction of hypo-
tension if the cause is known to be the premedication or the result of relaxation after induction of anesthesia. The choice of vaso-pressor depends on the patient's pulse rate. Ephedrine sulfate, 25 mg., is used if the pulse rate is slow. Methoxamine hydrochloride, 10 mg., is given intramuscularly when tachycardia occurs. These drugs are given intravenously only when there is a precipitous decrease in blood pressure.

One final precaution we feel is important: Care should be taken in moving the patient to the cart or bed, because sudden changes in position have been known to precipitate shock.

If in the immediate postoperative period the anesthetist notes any pronounced change in the patient's blood pressure, color, pulse, or respiration, the administration of oxygen by nasal catheter is started.

**Conclusions**

In conclusion, we would like to defend the stand we have taken in this discussion. First of all, it is generally conceded by surgeons and anesthetists that ether anesthesia, properly controlled, has the widest margin of safety, from the standpoint both of administration and of the patient's physiologic response. It may be thought by some that ether given by the open drop method to an adult is an outmoded technic, but from our viewpoint it has offered these advantages: There is less resistance to breathing in a patient whose vital capacity is reduced by age and debility; the difficulty encountered in obtaining a closed system with a face mask is obviated; the explosive range is lowered; dead space and the accumulation of carbon dioxide are reduced. In spite of the belief by some that the reduction of fractures and other orthopedic procedures necessitate deep planes of anesthesia, it is our feeling that for the aged patient stage III, plane one anesthesia is adequate to reduce reflex irritability enough to prevent traumatic shock.

**Summary**

This article presents a study of the choice of anesthesia for 250 hip pinnings, which were performed at Cincinnati General Hospital in 1950 and 1951, with no mortality either during operation or within the first three postoperative days. The patients were in the age group of 60 to 93 years.