ANESTHESIA ADMINISTRATION IN THE ELDERLY

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The population of the United States is aging at a dramatic rate with average life expectancy increasing from 47 years in 1900 to 75 years in 1984. The percentage of individuals 65 and over has risen from 4% at the start of the century to 12% today. Moreover, the number of senior citizens will double by the year 2030 to approximately 60,000,000 or 20% of the population with the fastest growing subgroup being persons over the age of 85. While the vast majority of older persons is generally healthy because of their absolute numbers, the small minority that is disabled has a profound impact on our health care system. The elderly account for 25% of all visits to family practitioners, representing one-third of all hospital stays, and utilize 30% of total health care expenditures.

The general principles, the physiology, and the pharmacokinetics of the elderly and their application to anesthesia care are discussed in this article. A brief discussion of the benefits of exercise in this age group is outlined. Finally, a description of the author's own anesthesia practice is included.

Physiology and Pharmacokinetics

Two of the basic tenets of geriatric medicine are that old age is not a disease and that the elderly are such a heterogenous group it is impossible to construct a definite physiologic profile of them. We know little about aging itself, but it is safe to say that the effects of the aging process itself have been exaggerated, and the modifying effects of lifestyle (eg, diet, exercise, personal habits) and social factors have been underestimated. The aging process begins at birth. While it is not always possible to separate aging from age-related diseases, aging is distinguished by the fact that unlike disease states, which typically wax and wane, aging always continues relentlessly.

A fundamental physiologic change that occurs with advancing age is a decrease in muscle mass and a corresponding increase in body fat. Thus, even though a 70-year-old man may weigh the same as he did when he was 40, the ratio of muscle to fat will have altered appreciably. Because most anesthetics are fat soluble, administering the same dose to a geriatric patient as one would give to a younger person often results in overdose. Therefore, although the same anesthetic agents can be used in both the young and old, dosages must be reduced in the elderly. This must be accompanied by frequent evaluation of the functional capacities of the pulmonary, cardiovascular, and skeletomuscular systems in order to titrate dosage of the anesthetic drugs to the changes of pharmacokinetics.

The author believes that even though an older person is basically healthy and appears much younger than his/her chronological age, the older person cannot tolerate anesthetic doses appropriate for a young person.

If a 30-year-old person with coronary artery disease resulting in reduced cardiac output is undergoing surgery, the need to decrease anesthesia dosage would be clear. Physiologically, the generally healthy and fit 70-year-old is more similar to this young, ill patient than he is to a young, healthy person since the elderly patient's cardiac output also is diminished due to a decrease in cardiac muscle mass that occurs with aging. Consequently, anesthesia administration in the elderly person also should be reduced.

Effects of Exercise

Regular physical activity and exercise are critical elements in adult health promotion. Increased levels of physical activity are associated with a reduced incidence of coronary heart disease hypertension, non-insulin dependent diabetes mellitus, colon cancer, depression, and anxiety. In addition, increased physical activity increases bone mineral content, reduces the risk for osteoporotic fractures, helps maintain appropriate body weight, and increases longevity.

Maximal oxygen uptake (VO2 max), an index of cardiorespiratory fitness, declines with age. Physical activity, however, can dramatically decrease the rate of decline. Athletes who are between the ages of 55 and 80 years who engage in regular endurance training experience less decline in VO2 max than comparably aged persons who are more sedentary. These athletes may also reduce risk for chronic diseases by maintaining normal body weight, blood pressure, glucose tolerance, and protein lipid levels. Recent studies of exercise training among the elderly have shown that older persons can adapt to increased exercise. Positive health benefits result from both high intensity (greater or equal to 60% of VO2 max) and low intensity (less than 60% VO2 max exercise).

Analysis of the 1985 National Health Interview Survey Supplemental Questionnaire on Health Promotion and Disease Prevention found that regular appropriate exercise is uncommon among persons whose age is greater than or equal to 65 years. Only 7% to 8% of this age group regularly engage in exercise capable of maintaining or improving cardiorespiratory fitness. Moreover, about two-thirds of the persons in this age group are either active irregularly or completely sedentary. The remainder exercise regularly, but for an intensity too low to improve their cardiorespiratory fitness. However, this latter group may receive other health benefits from exercise.

The survey and the exercise study underscore the need for improved understanding of the determinates and health

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effects of physical activity among the elderly. Greater effort should be made to promote increased levels of exercise among the elderly to insure the maintenance of vitality and an acceptable quality of life for older persons. The implementation of the Surgeon General's recommendations for physical fitness and exercise should help promote the type and quantity of exercise most appropriate for improving the health of older persons.

Anesthesia Administration for Ophthalmic Procedures

The author's personal experience involves administering anesthesia to the elderly at an ophthalmic outpatient center. Therefore, a brief discussion of the manner of handling these patients at this center follows.

A careful evaluation is done in the preoperative area. History and physical are already on the chart by another physician with a recent electrocardiogram. Previous consultation between the ophthalmologist, anesthesiologist, and personal physician is available if problems are foreseen that require additional laboratory work, other studies, or treatment. The morning of surgery, the anesthesiologist reviews the patient's chart and does any further evaluation necessary. The heart and lungs are evaluated as well as other vital signs. Medications are started early if fine tuning is needed for medical problems, eg, hypertension, coughing, wheezing, or tremors.

The eye and its surroundings are usually considered to be the most sensitive part of the entire body. The suggestion of surgery in this area usually arouses anxiety in the patient. Patients are prepared for coping with this anxiety by an extensive teaching program occurring before the day of surgery. The most sensitive part of the eye, the cornea and conjunctiva, are completely anesthetized in less than 60 seconds by just one drop of the proper topical anesthetic agent. After this, the drops to dilate the pupil are started. Almost totally, local anesthesia is used for ophthalmic procedures. With a well-planned preanesthetic preparation of patients capable of cooperative understanding, the selection of local anesthesia will lead to limited anxiety. Sometimes the patient may feel that the draping over the face is unpleasant, but this is easily alleviated by the administration of oxygen and raising the drapes to permit free escape of carbon dioxide.

Local anesthesia entails little risk and is therefore less dependent on the patient's general health. Local anesthesia is preferred in diabetic patients because it does not interfere with their usual treatment or food intake. Though the patient is conscious during the operation, the procedure does not feel too unpleasant to him/her, and the patient is often pleased to be able to keep informed about his/her own treatment. Local anesthesia has a rapid onset, and with the available anesthetic agents, it can be dispensed to last for sufficiently long periods of time to alleviate immediate postoperative pain. Local anesthesia induced akinesia creates a low intraocular tension advantageous for intraocular surgery and an immobile eye and permits the surgeon to manage the size of the pupil, which is usually somewhat dilated owing to the paralysis of the ciliary ganglion.

Preparation for anesthetizing the eye is begun by titrating small doses of Midazolam to the point where the patient has slurred speech. It is very important to proceed only to this stage, and this can easily be accomplished with slow administration of the drug. After prepping the eye with an iodine solution, a periocular block is done, which the patient does not remember in 95% of the cases. If the patient does remember this, he/she finds it only mildly distasteful. At the author's institution, a periocular block is used that gives complete akinesia and complete loss of any pain sensation and is believed to be safer than the retrobulbar type block that used to be more common. After the block, the patient is again raised to the upright position, a Honan cuff is applied for 20 to 30 minutes, and the patient is checked for a good block while waiting for surgery. If additional local solution is needed, it is given at this time. Almost all the patients are surprised that they have received the block around their eye and are very happy that they didn't have to experience that sensation. Shortly before surgery, the patients are transported to the operating room and prepared for surgery by the personnel in the operating room. While there, the patient is monitored by sight, electrocardiogram, monitor, pulse oximetry, and oral contact at frequent intervals to reassure the patient. The drapes are raised as discussed earlier to prevent carbon dioxide accumulating in the patient. This is particularly important in patients with respiratory disease. A small amount of oxygen is administered to each patient by nasal cannula. After the surgery, the patient is transported to the postoperative area where the patient is observed carefully by the postoperative care nurse who also gives him/her refreshments in the form of coffee, tea, or soda and a muffin if so desired. The patient receives instructions for his/her postoperative care. Following this, the patient walks to the dressing room, dresses himself/herself, and goes home.

The author feels that this method of anesthesia care is the best possible method for these patients. They have amnesia for pain, are easily aroused, and are awake to participate in any discussion needed. They experience no nausea or vomiting, have minimal postoperative disorientation and pain, and experience a rapid return to normal. □