Common Surgical Procedures in the Elderly

From hip and knee replacements to cataract and heart surgery, America's elderly undergo 20% of all surgical procedures. For a group that comprises only 13% of the US population, this statistic signifies how important it is that we understand the special needs of the elderly as they face the prospect of surgery. As we age, we undergo more surgeries on average, and we have a greater chance of experiencing complications after surgery.

Anesthesiologists and geriatricians share the role of managing medical illness along with surgical issues. During the immediate perioperative period, anesthesiologists provide the principal care and generally function as the primary care physicians for the geriatric perioperative patient. Problems that arise, such as hypertension, hypoxemia, or hyperglycemia, are judged correctable, and an appropriate intervention is initiated by the anesthesiologist prior to surgery. Activity of chronic illness is quite variable over time, and a long-term treatment plan is the most effective approach to managing problems that will most likely not be cured. When an older person with stable osteoarthritis, heart disease, hypertension, and diabetes falls and breaks a hip, physicians caring for this patient must address both the acute illness and its potential effects on various organ systems and the longer-term management of chronic illnesses to reestablish homeostasis and optimize function. The best outcomes can be expected from comprehensive, coordinated, and attentive management of both the acute and chronic disease states of older surgical patients.

Beyond appropriate management of accumulated chronic illnesses, anesthesiologists and geriatricians can contribute to improved outcomes by comprehensive risk assessment and management. There is a long history of this tradition in anesthesiology, as evidenced by the remarkable value of the ASA Physical Status scoring system that has been used to successfully risk-stratify operative patients for over 50 years. Additional methods have been developed to predict specific complications, such as the Goldman criteria for cardiac complications of noncardiac surgery, and the timed-walk test to predict pulmonary complications.

More recently, the American Heart Association and the American College of Cardiology have developed a practice guideline for cardiovascular evaluation for noncardiac surgery. A significant advantage of this guideline is its explicit recommendations for specific clinical situations. Clinicians are prompted to consider comorbid conditions, functional abilities, and the risk of the surgical procedure in a step-wise approach to determine what measures should be taken before the patient arrives in the operating room. From the perspective of the geriatrician, two aspects of this guideline are especially notable. First, "advanced age" is included among the minor clinical predictors, acknowledging that chronological age is a much less important risk factor than the extent of concomitant medical problems. Second, physical functional status, a central concern in geriatric medicine, is featured prominently in the guideline. As this guideline becomes implemented, we hope to see reports of improved patient outcomes.

Important studies have been done to examine the role of intraoperative anesthetic management of selected patient outcomes. Regional and general anesthesia have been compared with respect to mortality, thromboembolism, blood loss, and pulmonary function, among other outcomes, but no widespread consensus has emerged regarding the application of these approaches. Combined approaches are also being investigated, but more studies need to be done on older persons facing a variety of different operations. Postoperative pain management strategies have also been

compared, with limited attention to outcomes other than analgesia. Working together, anesthesiologists and geriatricians could design studies that will address acute illness and chronic disease outcomes that are important to the overall health status and quality of life of older persons.

It is estimated that by the year 2030, about 20% of Americans will be older than 65, while 1 out of 4 elderly individuals will be older than 85 years of age. Twenty-one percent of those over age 60 will undergo surgery and anesthesia as compared with only 12% of those aged 45 to 60 years. Despite the higher numbers of elderly patients having surgery, mortality and morbidity rates have been declining. Old age appears to have assumed less influence as a determinant of adverse outcome as perioperative care has improved. A better understanding of the associated risk factors leading to perioperative complications may help anesthesia providers to further lower the risk. This lecture reviews recent studies examining common perioperative adverse events and their associated risk factors in elderly patients.

Mortality

Recent studies have shown a decline in perioperative mortality rates, from 20% in the 1960s to 10% in the 1970s and 5% to 6% in the 1980s. This trend extends to those on the extreme end of the age spectrum. For example, a study by Warner from 1998 reported on 31 patients over 100 years of age. The patients had postoperative mortality rates of 0%, 16.1%, and 35.5% on 48-hour, 30-day, and 1-year follow-up, respectively. The survival rate was the same for the patients who underwent surgery as for control subjects who did not have surgery.

Several risk factors for perioperative mortality have been identified. Emergency procedures are associated with a higher mortality rate regardless of the age group. In 795 patients above 90 years of age, the 48-hour mortality rate for patients undergoing emergency surgery was 7.8% versus 0.6% in an age-matched cohort undergoing elective surgery. The location of the surgical site also has an important impact on mortality rate. Procedures involving the thorax or abdomen have been shown by multiple studies to be associated with higher complication and mortality rates. In addition, coexisting diseases have been found to be important risk predictors of perioperative mortality. Current data support the view that the effects of coexisting disease outweigh the effects of age alone on anesthetic outcome. When age and severity of illness are compared, the number of coexisting diseases is more significant. Recently, several studies have identified albumin level to be a good predictor of postoperative mortality. Albumin, a marker of nutritional status, may serve as a surrogate marker for the preoperative health status of the surgical geriatric patient.

Because emergency procedures increase perioperative risk, early surgical treatment should be considered whenever possible. Delaying surgery just because of the patient’s age is not supported by the literature. Every effort should be made to perform a thorough preoperative evaluation, including nutritional assessment, and to optimize the status of the patient’s chronic medical diseases as much as possible before surgery. That assessment and care should continue postoperatively, especially after emergency surgery where there may be insufficient time for preoperative improvement.

Cardiovascular Morbidities

The elderly are more prone to develop cardiovascular complications. A study by Pedersen et al in 1990 examined patients over 80 years of age who were undergoing anesthesia. The cardiovascular complication rate was 16.7%, compared to 2.6% for patients under 50 years of age. A high rate of cardiovascular complications (40%) was found in patients with preoperative heart disease, especially those with clinical signs of congestive heart failure, prior history of ischemic heart disease, or previous myocardial infarction. One recent study found a cardiovascular complication rate of 12.5% in 367 patients over 80 years of age undergoing noncardiac surgery. These results, along with those from previous studies, suggest that the type of anesthesia does not influence perioperative cardiovascular morbidity. Hemodynamic control may be more important.

While some of the risk factors associated with adverse cardiovascular outcomes have been identified, randomized studies have not determined whether risk factor modification would improve outcomes. Some risk factors, such as a history of congestive heart failure, may be difficult to diagnose preoperatively. In fact, one third of geriatric patients with heart failure may have diastolic dysfunction despite having normal systolic function. In the absence of specialized tests for estimating preoperative heart function, the goal should be to optimize symptomatic complaints as much as possible prior to surgery.

Pulmonary Morbidities

In a study of 7,306 anesthetics administered to patients over 80 years of age by Pedersen et al, 10.2% of patients developed pulmonary complications, similar to the rate of 7% found in a recent study of patients 80 years or older. A prior history of congestive heart failure and prior neurological history increased the odds of an adverse postoperative pulmonary event.

Preoperative optimization of respiratory function is important in decreasing adverse pulmonary events. Cessation of smoking, even immediately prior to surgery, is associated with better outcomes because carbon monoxide levels decrease soon after smoking cessation. Good exercise capacity may also impact perioperative outcome. In a study investigating patients scheduled for abdominal and noncardiac thoracic surgery, patients who were unable to raise their heart rate above 99 beats per minute or perform 2 minutes of supine bicycle exercise had a higher cardiopulmonary complication rate (42% vs. 9.3%).

Neurologic Morbidities

There is a wide variation in the reported incidence of postoperative cognitive deficit (POCD) in the literature. One of the largest studies of elderly surgical patients was conducted by Moller et al. The authors found that POCD was present in 25.8% of patients 1 week after surgery and in 9.9% of patients 3 months after surgery. This was compared to a control group of hospitalized patients not undergoing surgery who had a POCD rate of 3.4% at 1 week after hospitalization and 2.8% at 3 months after hospitalization. Increasing age, increasing duration of anesthesia, lack of education, a second operation, postoperative infections, and respiratory complications were identified as risk factors for early cognitive dysfunction.

Several studies have looked at general versus regional anesthesia, as general anesthesia may lead to changes in cerebral blood flow and cerebral metabolic oxygen consumption. The evidence to date suggests that although cognitive deficits may occur postoperatively, no particular anesthetic technique appears to be implicated. Furthermore, in a study of ours, a history of preoperative neurological disease influenced the risk of POCD. Until more definitive clinical studies become available, minimizing the number of medications used, avoiding hypoxemia and hypercarbia, providing adequate postoperative pain control, and involvement of geriatricians in postoperative care appear to be the best approaches to minimizing the risk of POCD in the geriatric surgical patient.

Sedation Outside the Operating Room

It is estimated that within the next decade, 20% to 40% of anesthetic cases may be performed outside the operating room. Patient demand has influenced the increase in outpatient surgery, with surveys showing that the elderly prefer ambulatory settings. In addition, Medicare favors outpatient protocols for certain procedures.

Liability claims for adverse events associated with sedation have also substantially increased. Levels of injury are comparable with general anesthetics, with those injured tending to be older, more debilitated, and undergoing outpatient surgery.

The expansion of outpatient procedures for the elderly must be viewed with caution, as it seems that perioperative complications increase with age. However, that observation is controversial. The increase in complications is probably more a function of associated concurrent diseases than of age in and of itself.

Still, one must appreciate that geriatric patients have limited physiologic reserves. There is less heart rate responsiveness in response to hypotension. Ventilatory responses to hypoxia and hypercarbia are reduced, with greater risk of apnea. Impairments in thermoregulation and water balance increase vulnerability for hypovolemia and hypothermia. Changes in volume of distribution, bioavailability, and receptor sensitivity lead to alterations in the pharmacodynamics of most drugs. Limitations in renal clearance and hepatic function require attenuation of dosage. Because many elderly have prolonged circulation time, longer periods are required for interval dosing. Thus, titration to effect is an important principle in applying clinical judgment to the geriatric patient.

For sedation of the geriatric patient, the agent of choice should have a short half-life, with minimal active metabolites and limited side effects. One should avoid using standard dosages calculated on a mg/kg basis. These boluses frequently produce unwanted respiratory depression and hypotension. Slower administration of an agent and allowing more time for peak effects often achieves the desired goals with less overall dose.

Midazolam and fentanyl are a common combination used for conscious sedation. Due to increased sensitivity in the elderly and decreased clearance of these agents, smaller doses and more delayed increments must be used. Propofol also has a reduced clearance in the elderly. Older patients require lower doses for any given effect, in many cases as little as 50% of the expected “standard” dose.

Remifentanil is the newest ultrashort-acting agent on the market and its use is currently being explored. It offers potent, rapid analgesia, but its rapid offset may be a double-edged sword in cases involving prolonged discomfort. In the elderly, its use appears to be associated with an increased incidence of hypoventilation. Although clearance is quite rapid and independent of age, the dosage required for clinical effect in the elderly is at most 50% of package insert guidelines. The utility of remifentanil as a sedative needs to be more thoroughly evaluated, but at this time there appears to be only modest enthusiasm for it compared to other currently available agents.

Safe sedation of elderly patients includes maintaining appropriate practice standards in all areas where these agents are administered. The Joint Commission on Accreditation of Healthcare Organizations addressed this issue by mandating that institutions develop protocols for conscious sedation. While JCAHO does not set specific standards for practice, it states that institutions should have polices dealing with evaluation, personnel, equipment, monitoring, and recovery. It also requires evidence of monitoring for compliance. Anesthesiologists should be involved in the establishment of these protocols, because they identify patients who require care beyond the scope of conscious sedation.

Among various logistic considerations, geriatric patients take longer to accomplish many tasks. Thus, more time must be allowed for pre-procedure preparation. Also, older patients' skin may be fragile, so adhesive tape should be used with caution to avoid torn skin. Extra padding should be used on procedure tables to prevent compression sores. The elderly are less agile and may require equipment aids (e.g., chair raisers or footstools). Many elderly are hearing impaired, and the use of both verbal and written post-procedure instructions may foster comprehension.

Several novel approaches to sedation have recently evolved, and a few may prove useful in enhancing the care of geriatric patients undergoing procedures in remote locations. Similar to patient-controlled analgesia, the concept of patient-controlled sedation is now being explored. Several studies have demonstrated its safe and efficacious use for conscious sedation in the operating room. However, one study, which used propofol in the treatment of the elderly, found an increased incidence of profound sedation. The boundaries of this technique have yet to be defined.

Bispectral index monitoring is currently being evaluated for level-of-consciousness monitoring. The processed EEG signal is quantitated and used as an indicator of sedation level. It may allow the titration of sedatives by minimizing usage of agents, thus speeding up recovery time.

For anesthesia departments noting increased use of conscious and deep sedation outside their operating rooms, we may see the advent of formal anesthesia sedation services available throughout a hospital community. Advantages of such a service include providing a hospital with timely, reliable, high-quality service with optimization of recovery and turnaround time.