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Polypharmacy and Perioperative Medications in the Elderly **377**

Sheila Ryan Barnett

Polypharmacy is a significant and complex problem affecting more than 40% of the geriatric population. Accurate medication histories may be difficult to obtain, but must include over-the-counter remedies as well as prescription. Physiologic changes occur with aging that predispose elderly patients to adverse drug events. At a minimum, medications with significant anticholinergic properties should be recognized and avoided in the perioperative period.

Parkinson's Disease and Deep Brain Stimulator Placement **391**

Stacie Deiner and John Hagen

Deep brain stimulation (DBS) has added to the comfort and quality of life for an increasing number of Parkinson's disease (PD) patients. The anesthesiologist needs to understand the pathophysiology of the disease, the surgical procedure, and its postoperative implications to most effectively manage these patients. This article examines the role of the anesthesiologist in the pre- and perioperative management of patients undergoing DBS procedures. In terms of the general anesthetic management of PD patients, it is clear that no simple anesthetic regimen exists. Anesthesiologists can provide the best care through preoperative assessment, maintenance of PD drug therapy, and avoidance of known precipitating agents.

Atrial Fibrillation in the Elderly **417**

Gregory W. Fischer

Atrial fibrillation (AF) remains the most common form of cardiac arrhythmia seen in man, and often requires acute intervention. This article provides an overview of the incidence, prevalence, etiology, and pathophysiology of AF in elderly patients, with special emphasis on the perioperative period. The pharmacologic and nonpharmacologic management strategies available to the anesthesiologist are described. The anesthesiologist must be aware of the causes, consequences, and treatment of elderly patients developing AF during the perioperative period, as well as patients presenting to the operating room with chronic AF.

Delayed Arousal

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Zirka H. Anastasian, Eugene Ornstein, and Eric J. Heyer

Elderly patients have medical and psychological problems affecting all major organ systems. These problems may alter the pharmacokinetics and/or pharmacodynamics of medications, or expose previous neurologic deficits simply as a result of sedation. Delayed arousal, therefore, may arise from structural problems that are pre-existent or new, or metabolic or functional disorders such as convulsive or nonconvulsive seizures. Determining the cause of delayed arousal may require clinical, chemical, and structural tests. Structural problems that impair consciousness arise from a small number of focal lesions to specific areas of the central nervous system, or from pathology affecting the cerebrum. In general, focal or multifocal lesions can be identified by computerized tomography, or diffusion-weighted imaging. An algorithm is presented that outlines a workup for an elderly patient with delayed arousal.

Postoperative Delirium in the Elderly Surgical Patient

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Frederick E. Sieber

Delirium is a common complication in the geriatric population following cardiac and noncardiac procedures. Postoperative delirium is a significant financial burden on the United States health care system and is independently associated with prolonged hospital stay, increased risk of early and long term mortality, increased physical dependence, and an increased rate of nursing home placement. The Confusion Assessment Method (CAM) is a bedside rating scale developed to assist nonpsychiatrically trained clinicians in the rapid and accurate diagnosis of delirium. The CAM has been adapted for use in ventilated intensive care unit (ICU) patients in the form of the CAM-ICU. The onset of delirium involves an interaction between predisposing and precipitating risk factors for delirium. The mainstay of delirium management is prevention. The approach involves control or elimination of modifiable risk factors. It is controversial whether anesthetic technique determines delirium. However, important modifiable risk factors under the anesthesiologist's control include adequate postoperative pain management, careful drug selection, and embracing and participating in a multidisciplinary care model for these complicated patients.

Postoperative Urinary Retention

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Daniela M. Darrah, Tomas L. Griebing, and Jeffrey H. Silverstein

Postoperative urinary retention (PUR) is a common complication of surgery and anesthesia. The risk of retention is especially high after anorectal surgery, hernia repair, and orthopedic surgery and increases with advancing age. Certain anesthetic and analgesic modalities, particularly spinal anesthesia with long-acting local anesthetics and epidural analgesia, promote the development of urinary retention. Portable ultrasound provides rapid and accurate assessment of bladder volume and aids in the diagnosis and management of PUR. Catheterization is recommended when bladder volume exceeds 600 mL to prevent the negative sequelae of prolonged bladder overdistention.

Postoperative Cognitive Dysfunction in the Elderly 485

Ramesh Ramaiah and Arthur M. Lam

Despite improvement in surgical techniques, anesthetic management, and intensive care, a significant number of elderly patients develop postoperative cognitive decline. Postoperative cognitive dysfunction (POCD) is a postoperative memory or thinking impairment that has been corroborated by neuropsychological testing, for which increasing age is the leading risk factor. POCD is multifactorial in origin, but it remains unclear whether its occurrence is a result of surgery or general anesthesia. This article discusses the incidence, assessment, consequences, and prevention of POCD, as well as anesthetic strategies to improve cognitive outcome in elderly patients.

Diastolic Dysfunction, Cardiovascular Aging, and the Anesthesiologist 497

David Sanders, Michael Dudley, and Leanne Groban

As the number of persons aged 65 years and older continues to increase, the anesthesiologist will more frequently encounter this demographic. Cardiovascular changes that occur in this patient population present difficult anesthetic challenges and place these patients at high risk of perioperative morbidity and mortality. The anesthesiologist should be knowledgeable about these age-related cardiovascular changes, the pathophysiology underlying them, and the appropriate perioperative management. Whether presenting for cardiac or general surgery, the anesthesiologist must identify patients with altered physiology as a result of aging or diastolic dysfunction and be prepared to modify the care plan accordingly. With a directed preoperative assessment that focuses on certain aspects of the cardiovascular system, and the assistance of powerful echocardiographic tools such as tissue Doppler, this can be achieved.

Aortic Valve Stenosis 519

Charles Z. Zigelman and Patti M. Edelstein

Calcific aortic stenosis (AS) is primarily a disease of the elderly, possessing features that are biomechanical as well as systemic and inflammatory in nature, with risk factors and histopathology similar to atherosclerosis. To date no medical therapy has been shown to conclusively alter the progression of the disease, and for those with symptomatic AS, aortic valve replacement (AVR) is advocated. Factors that may alert the physician to an accelerated progression of calcific aortic valvular disease toward severe symptomatic AS include moderate aortic valve calcification, chronically dialyzed patients, and patients 80 years and older. There remains significant morbidity and mortality associated with AVR, and new techniques and technologies for AVR are being developed. For those who undergo successful AVR the long-term prognosis is good. A substantial number of patients with symptomatic AS present for anesthesia care for a variety of procedures. A thorough, modern understanding of AS and its course are necessary for the anesthesiologist to guide the patient through the perioperative period.

Fat Embolism

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Shamsuddin Akhtar

Fat embolism refers to the presence of fat droplets within the peripheral and lung microcirculation with or without clinical sequelae. The pathologic consequences of fat embolism are well recognized. Fat embolism is most often associated with trauma and orthopedic injuries. Fat embolism syndrome (FES) is a serious manifestation of fat embolism that involves a cascade of clinical signs such as petechial rash, deteriorating mental status, and progressive respiratory insufficiency, usually occurring within 24 hours of injury. This article reviews the definition, epidemiology, etiology, pathophysiology, clinical presentation, diagnosis, management, and prognosis of FES.

Anesthetic Management of Acute Mesenteric Ischemia in Elderly Patients

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Alexander A. Vitin and Julia I. Metzner

Ischemic insult to the splanchnic vasculature can jeopardize bowel viability and lead to devastating consequences, including bowel necrosis and gangrene. Although acute mesenteric ischemia (AMI) may occur at any age, the elderly are most commonly affected due to their higher incidence of underlying systemic pathology, most notably atherosclerotic cardiovascular disease. Treatment options include pharmacology-based actions, endovascular, and surgical interventions. AMI remains a life-threatening condition with a mortality rate of 60% to 80%, especially if intestinal infarction has occurred and surgical intervention becomes emergent. Early recognition and an aggressive therapeutic approach are essential if the usually poor outcome is to be improved. Anesthetic management is complex and must account for comorbid disease as well as the patient's presumptive acute deterioration. Blood pressure support typically involves careful, but often massive, fluid resuscitation and may also additionally require pharmacologic support.

Informed Consent and the Ethical Management of the Older Patient

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Yulia Ivashkov and Gail A. Van Norman

Informed consent in elderly patients presents many ethical and legal challenges. Most aging patients are competent to provide consent for medical care. The purpose of informed consent is to promote autonomy, to protect a patient from undesired treatment, and to help the patient to make appropriate medical care decisions that correlate with his or her personal values. A surrogate decisionmaker should be sought for an incompetent patient. Advance directives are legally and ethically binding tools by which patients can express their decisions regarding medical care before they lose capacity to do so. Discussion of do-not-resuscitate orders is part of informed consent, and patients' wishes regarding resuscitation in the operating room should be respected. Surrogate consent for participation in research is not necessarily allowed by IRB approval and research protocols.

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Stefan A. Lombaard and Reinette Robbertze	
Elderly patients are increasingly referred for complex surgery, but are at particular risk for coronary artery disease. One strategy to prevent perioperative cardiac events in elderly patients is to employ perioperative β -blockade, but doing so has the potential to increase the incidence of congestive heart failure, perioperative hypotension, bradycardia, and stroke. This article examines common comorbidities in the elderly who may benefit from the chronic use of β -blockers, prophylactic perioperative use of β -blockers including timing, dosage, and choice of β -blocker, the pharmacologic effects of aging, and recommendations on the use of β -blockers.	
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Daniel K. O'Neill and Jason Maggi	
Wound patients commonly have multiple comorbidities, which should be optimized before anesthesia. These factors contribute not only to skin breakdown but also other causes of mortality and morbidity. Skin becomes more vulnerable to damage from pressure, friction, shear, and moisture when the skin is dry, less elastic, and less perfused. Careful assessment and implementation of an anesthetic plan using regional or general techniques can improve outcomes. The anesthesiologist plays a vital role in maintaining homeostasis during the surgically stressful perioperative period of the wound patient. Aggressive wound management in the early stages is likely to prevent wound progression to deeper levels. Policies are being implemented to decrease the risk of pressure ulcers by prevention.	
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