

Geriatric Patient

The natural history of aging involves both physiologic and anatomic changes that must be considered when caring for the elderly patient.

ANESTHETIC CONSIDERATIONS:

- Physiologic and anatomic changes associated with advanced age
- Altered drug pharmacokinetics and pharmacodynamics as well as general increased sensitivity to anesthetic agents and adjuncts.
- Increased incidence of significant coexisting disease.
- Polypharmacy and potential for drug interactions.
- Increased incidence of postoperative delirium/cognitive dysfunction.
- Increased incidence of postoperative complications after age 80 (including MI, cardiac arrest, pneumonia, >48h on ventilator, reintubation, CVA, ileus)
- Consent issues, ethical issues, DNR status

ANESTHETIC GOALS:

- preoperative optimization of coexisting disease (especially cardiovascular and respiratory conditions)
- review of relevant medications and possible drug interactions
- appropriate dose adjustment of anesthetic medications
- appropriate disposition arrange for postoperative care and awareness of increased risk of postoperative complications

Priority Resuscitation History Exam Labs Pfts(etc) Regional

PREOPERATIVE:

Priority:

- Emergent
- Urgent
- Elective

History

1. HPI
2. PMHx – specifically cardiovascular disease, cerebrovascular disease/neurological deficits, pulmonary disease, renal disease, hepatic disease
3. PSHx – previous anesthetic experiences
4. Medications
5. Allergies
6. Last Meal/NPO status
7. Functional status

Physical

1. Focused neurological exam (GCS, focused on any pertinent findings, documentation of neurological deficits prior to regional techniques)
2. Focused cardiopulmonary exam (fluid status, JVP, cap refill, heart sounds, murmurs, rales/wheezes/adventitious chest sounds)

Investigations

- a. Labs (CBCd, lytes, BUN, Cr, INR, PTT as needed)
- b. ECG (if age >60 or history of cardiovascular disease or hypertension)
- c. ACC/AHA guidelines to dictate further cardiovascular workup

Optimization

1. preoperative medication optimization
2. appropriate workup of unstable coronary or pulmonary diseases
3. GERD prophylaxis
4. DVT prophylaxis
5. Preoperative antibiotics as needed
6. DMII optimization
7. Timing of dialysis for patients on IHD

Room Preparation/Setup

- standard emergency drugs
- standard machine check (including suction, gas line supply, emergency O2 supply, inhalational agents, CO2 absorbant, circuit leak test)

ANESTHETIC OPTIONS:

1. nothing
2. MAC
3. regional
4. neuraxial
5. general

MANAGEMENT OF ANESTHESIA:

Induction

1. appropriate dose reduction of opioids, IV anesthetic agents; appreciation of prolonged onset of NMBAs

Maintenance

1. Decreased MAC

Emergence

1. postoperative disposition

Postoperative Disposition:

1. consider postoperative ICU or obs as needed

Complications:

1. Post operative delirium and post operative cognitive dysfunction

PATHOPHYSIOLOGY:

1. **Physiology of Aging:**

- a. **BODY COMPOSITION:** characterized by loss of skeletal muscle and increase in body fat → decreased total body water
- b. **PHARMACOKINETICS/DYNAMICS:**
 - i. pharmacodynamic or pharmacokinetic alterations usually resulting in increased end organ effect (decreased total body water, decreased muscle mass and therefore prolonged effect in muscle rich group, decreased protein binding due to hypoalbuminemia)
 - ii. Altered metabolism of drugs: decrease in hepatic blood flow (20-40% - associated with reduction in phase I drug metabolism and bile secretion); decreased renal cortical mass (20-25%) and subsequent decrease in GFR (1cc/min/year after age 40) requiring renal dose adjustment approximately after age 60
- c. **RENAL:** decreased GFR and altered regulation of fluid and electrolyte homeostasis (impaired aldosterone secretion, impaired ADH secretion)
- d. **ENDOCRINE abnormalities:** hypothyroidism, altered insulin secretion and resistance, decreased sensitivity to testosterone, estrogen, GH
- e. **CNS aging:** 6% decrease in MAC for each decade after 40; decreased neurotransmitter function (GABA, acetylcholine, serotonin, dopamine); increased frequency of postoperative cognitive decline/delirium
- f. **CVS:** decreased response to beta receptor stimulation, stiffening of myocardium, arteries and veins, increased sympathetic activity, decreased parasympathetic activity, conduction system changes (SSS, Afib, blocks), decreased ischemic preconditioning. HTN and LVH with associated diastolic dysfunction
- g. **RESP:** increase in closing capacity into FRC leading to resting hypoxemia, stiffened chest wall and flat diaphragm combined with increased lung compliance (decreased elastance), more prone to respiratory failure, decrease in respiratory response to hypercapnea and decreased ventilatory response to hypoxia, sleep disordered breathing, less effective coughing and swallowing → higher risk of aspiration
- h. **THERMOREGULATION:** alteration of vasoconstriction and heat production leading to increased risk of perioperative hypothermia

2. **Drug Dosing:**

- a. Propofol: 20-60% bolus dose reduction, dose on lean body mass; 50% infusion dose reduction
- b. Pentothal: 20% bolus reduction
- c. Etomidate: 25-50% bolus reduction
- d. Midazolam: modest reduction in bolus dose at age 60, 75% reduction at age 90
- e. Morphine (as well as hydromorphone, methadone): bolus dosing 50% reduction (half of peak effect at 5min, peak morphine effect at 90min); watch for prolonged context sensitive half time
- f. Fentanyl (and all synthetic fentanils): 50% bolus reduction, 50% infusion reduction
- g. Rocuronium: slower onset (minimal) modest increase in metabolic t_{1/2}
- h. Pancuronium: renal elimination, aging doubles metabolic t_{1/2}
- i. Succinylcholine: ~40% slower onset
- j. Neostigmine: despite pharmacokinetic changes, some studies indicate need for increased dose with age

REFERENCES:

Barash 6th Edition, Chapter 35