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جامعة المستقبل
كلية التقنيات الطبية
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Title: Geriatric Anesthesia

GERIATRIC ANESTHESIA

- The geriatric population (The elderly) experiences significant alterations of many organ systems as a result of the aging process. They also have several **co-morbidities** including **hypertension**, **cardiac disease**, **diabetes**, **cerebrovascular disease**, and **renal dysfunction**.
- Geriatric patients are considered **vulnerable** and especially **sensitive to the stress of trauma, surgery, and anesthesia**.

GERIATRIC ANESTHESIA STRATEGIES

A. Preoperative Evaluation

- **Tests** should be directed toward the **type of surgery**, known **co-existing disease**, and **history** and physical **examination** findings.
- Electrocardiogram (**ECG**), hematocrit (**Hct**), and hemoglobin (**Hgb**) are often the **most useful tests**.

1. Cardiac

Major changes

- **Reduced art. Elasticity** lead to (increase afterload, systolic **bp**) , **LV hypertrophy**
- Poor tolerance to **iv fluid**
- Reduced **autonomic** activity (reduced resting HR ,max HR, baroreceptor reflex)
- Reduced **sensitivity** to E, NE
- Increased **vagal tone**

risk factors for major adverse cardiac events for non cardiac surgery

- **unstable coronary syndrome**, recent **MI**, within 4 weeks
- **decompensated heart failure**,
- **significant or unstable dysrhythmias**,
- **and severe or critical valvular disease**, especially **aortic stenosis**.

AMERICAN COLLEGE OF CARDIOLOGY AND AMERICAN HEART ASSOCIATION GUIDELINE FOR

cardiac risk factors for non cardiac surgery **INCLUDE 5** clinical factors

- ① • History of **IHD**
- ② • History decompensated heart **failure**,
- ③ • History of **CVA**
- ④ • **DM**
- ⑤ • **Renal** failure

Cardiac testing should be reserved for patients undergoing **intermediate** or **high-risk surgery**.

2. Pulmonary

Major changes

- Reduced lung and chest wall **compliance**
- Reduced **response** to hypoxia and hypercapnia
- Reduced **cough**
- **Aspiration** is common

Referral to a pulmonologist may be indicated if the patient has signs and symptoms of undiagnosed or decompensated lung dysfunction.

Risk factors for postoperative pneumonia include

- the **inability to carry out the activities of daily living,**
- **weight loss of 10% or more in the previous 6 months,**
- **history of stroke,**
- **long-term steroid use,**
- **smoking,**
- **and underlying lung disease.**

3. Renal

Major changes

- impaired Na handling
- reduced response to ADH
- reduced concentrating and diluting ability
- increased risk of failure

It is wise to obtain serum electrolyte levels and creatinine concentration before procedures that carry a significant risk of renal failure (e.g., cardiopulmonary bypass, aortic aneurysm resection, or surgeries in which large fluid shifts or significant blood loss are anticipated).

4. Hepatic

Baseline liver function tests may be reasonable before surgeries that involve significant liver manipulation.

5. Diabetes Mellitus

- difficult airway is a possibility, prayer sign to predict cervical mobility

PRAYER SIGN

A positive "prayer sign" can be elicited on examination with the patient unable to approximate the palmar surfaces of the phalangeal joints while pressing their hands together.

Seen in diabetics

; This represents:- cervical spine immobility and the potential for a difficult endotracheal intubation.



- **Poor glucose control** (blood sugar higher than 200 mg/dL) is associated with a risk of **aspiration, poor wound healing, infection, cardiac and cerebral events, and autonomic dysfunction.** Whenever possible, **control of serum glucose to levels of 120 to 180 mg/dL is desirable before surgery.**

6. **Less heat production and more heat loss lead to hypothermia**

7. **Malnutrition**

Serum albumin below 3 g/dL with hypocholesterolemia and low body mass index is indicative of malnutrition.

B. Pharmacokinetics and Pharmacodynamics

There is **no evidence** that any specific inhaled or injected anesthetic agent is **preferable** in elderly patients. Changes in body composition can affect the distribution, metabolism, and clearance of drugs.

1. Total Body Water:

Total body water is **decreased**, leading to a **higher plasma concentration of hydrophilic drugs** for a given dose.

2. Adipose to Lean Muscle Ratio:

The ratio is **increased**, and the volume of distribution of lipophilic drugs is **greater**, facilitating the accumulation of drugs and prolongation of effects. This is even more pronounced in the face of impaired hepatic or renal function.

3. Circulation Levels of Drug-Binding Proteins:

Levels **decrease**, leading to **increased free drug and drug effects.**

4. Decreased Cardiac Output.

This may **prolong circulation time** and may result in

- **more rapid uptake of volatile agents mean rapid inhalation induction .**
- **Slow iv induction**

5. Muscle Relaxant Effects

Decreased muscle blood flow delays the onset of action. **Reduced clearance** by the liver and kidneys may **prolong the action** of some relaxants.

6. Multiple Drug Prescriptions

Commonly, elderly patients are taking **multiple medications**, which may lead to **undesirable** drug effects or drug **interactions**.

7. Minimum Alveolar Concentration (MAC) of Volatile Agents

MAC **decreases with age**, about **4% per decade** after 40 years of age.

C. Anesthetic Plan: Anesthetic management for elderly

Patients require consideration of many details

1. Anesthetic Technique

- Retrospective and prospective studies have failed to show the benefit of regional versus general anesthesia.
- The technique should be based on patient choice, the anesthesiologist's experience with the technique, the American Society of Anesthesiologists (ASA) status of the patient, and the planned operation.

2. Monitoring

Monitoring should be based on

- potential risks and benefits,
- the potential for large blood loss or fluid shifts,
- the ASA status
- and comorbidities, and the planned surgery.

3. Optimal Analgesia

- Treatment of analgesia may be challenging due to pharmacokinetic and pharmacodynamics changes and the side effects of analgesic drugs **Dementia, delirium, and problems with hearing and vision can complicate pain assessment.**
- The physiologic consequence of inadequate analgesia (tachycardia, hypertension, agitation) may be poorly tolerated.

Postoperative Delirium

Delirium is defined as an acute alteration in cognitive function that progresses over a brief period lasting for a few days to a few weeks.

Risk Factors

1. Advanced age (>70)
2. Underlying dementia .
3. Various comorbidities
4. Drugs (narcotics and benzodiazepines).
5. Alcohol abuse.
6. Previous episodes of delirium.
7. Visual impairment.
8. Certain types of injuries (e.g., hip fractures).
9. Elevated blood urea nitrogen (BUN).

Treatment

Treating underlying disorders, 0.25 to 2 mg of oral haloperidol for acute control of delirium is the preferred treatment, but diazepam, droperidol, and chlorpromazine are also often used with good results.

Selects the best single choice

- 1- All the following are decreased in elderly except one
 - a) Cardiac output.
 - b) Total body water.
 - c) Circulation level of drugs binding proteins.
 - d) Adipose to lean muscle ratio.
 - e) Muscle blood flow.
- 2- The physiologic consequence of inadequate analgesia in elderly is
 - a) Hypotension.
 - b) Tachycardia.
 - c) Sedation.
 - d) Fever.
 - e) Bradycardia
- 3- Risk factors for postoperative pneumonia in elderly include (all true except one)
 - a) history of stroke.
 - b) Smoking.
 - c) underlying lung disease.
 - d) short-term steroid use
 - e) inability to carry out the activities of daily living
- 4- anesthetic plan for elderly patient (all true except one)
 - a) anesthetic technique is based on patient choice and anesthesiologist experiencing
 - b) analgesia may be challenging due to pharmacokinetic and pharmacodynamics changes.
 - c) MAC for inhalational agents is increases with age, about 4% per decade after 40 years of age.
 - d) Risk of post operative delirium.
 - e) prolong the action of some relaxants.
- 5- All the following are risk factors for delirium postoperatively in elderly except one
 - a) Visual impairment.
 - b) Underlying dementia,
 - c) Alcohol
 - d) Rib fracture.
 - e) Advance age.

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GOOD LUCK