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LETELY UPDATED
0 DRUGS PLUS APPENDICES

THE ANESTHESIA DRUGS HANDBOOK

SECOND EDITION

SOTA OMOIGUI

The Anesthesia Drugs Handbook

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Executive Editor: Susan M. Gay
Developmental Editor: Sandra Clark Brown
Project Manager: Peggy Fagen
Electronic Production Coordinator: Peggy Hill
Manufacturing Supervisor: Theresa Fuchs
Book Designer: Nancy McDonald

SECOND EDITION

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CONSULTING EDITORS

Louis Alexander III MD
Attending Anesthesiologist
Cook County Hospital
Chicago, Illinois

Tracy Charles MD
Assistant Professor of Anesthesiology
Director, Division of Obstetric Anesthesia
Martin Luther King/Drew Medical Center
Los Angeles, California

Nowa Omoigui MD, MPH
Senior Fellow, Division of Cardiology
Cleveland Clinic
Cleveland, Ohio

Julie Pippins PharmD
Staff Pharmacist
Memorial Medical Center
Jacksonville, Florida

Shirley Randall MD
Attending Anesthesiologist
Womack Army Hospital
Fayetteville, North Carolina

John Stewart PhD
Professor of Pharmacology
Louisiana State University Medical Center
Shreveport, Louisiana

PREFACE TO THE SECOND EDITION

This second edition is evidence of the rapidly changing field of anesthetic pharmacology and the enormous success of the first edition. Information on all drugs have been updated where applicable, including information on drug storage, current manufacturer, and FDA warnings and guidelines. Expanded dosing information has been provided on many drugs, including the muscle relaxants, narcotics, and local anesthetics. The ACLS protocol has been updated with the addition of the pediatric CPR drugs table in the appendix. New drugs have been added including carboprost, EMLA, enalapril, insulin, ondansetron, rocuronium, and metaraminol. Readers who wish to obtain more information on chronic pain drugs may consult *The Pain Drugs Handbook* (Mosby). Finally, I wish to welcome Dr. Tracy Charles, who joins our team of consulting editors and to thank Drs. Dennis Chambi and Glen P.K. Akiona for their review and valuable suggestions.

Sota Omoigui MD
internet address: sota1@aol.com

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PREFACE TO THE FIRST EDITION

The large and rapidly expanding field of anesthetic pharmacology has witnessed a dramatic proliferation in drugs available to the anesthesiologist. These drugs are administered as boluses or infusions by various routes such as intravenous, sublingual, oral, rectal, intranasal, intrapleural, transdermal, intraarticular, inhalational, epidural, caudal, spinal, etc.

The current state of the art requires an intimate familiarity with dosing information and pharmacology for this plethora of new drugs and new indications/routes of administration for old drugs. This may be overwhelming not only to the trainee but also to the seasoned practitioner. In the urgency of the operating rooms or critical care units where there is little room for error, there is a need for this pocket sized compendium that enables the anesthesiologist to identify the best drug, its dose, route of administration, and side effects at a moment's notice.

The Anesthesia Drugs Handbook reviews basic fundamentals of pharmacology and profiles the drugs and inhalational agents commonly used in anesthesia. Rather than providing a comprehensive description, the focus is on selected information required for proper use of each drug. The use of this drug handbook requires a well founded basic knowledge and practical experience which is essential for patient safety.

This handbook has been designed to fit the pocket of your operating room gown or scrub suit. It is hoped that it will make the difference in providing optimal patient care.

Sota Omoigui MD

CONTENTS

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Drugs

ADENOSINE (ADENOCARD)

Use(s): Treatment of acute paroxysmal supraventricular tachycardia (PSVT); differentiation of supraventricular tachycardia with intraventricular aberrancy from ventricular tachycardia; unmasking of surface ECG delta waves in patients with concealed accessory pathways; afterload reduction in low-output states; controlled hypotension during cerebral aneurysm surgery; pharmacologic stress testing (e.g., with thallium) in coronary artery disease.

Dosing: Treatment/diagnosis of PSVT: rapid IV bolus, 6-12 mg (children 0.05-0.25 mg/kg). May be repeated within 1-2 min (× 2 doses) if necessary. Single doses >12 mg are not recommended. More effective when administered via a central vein or into the right atrium.

Elimination: Cellular uptake and metabolism (deamination, phosphorylation)

How Supplied: Injection, 3 mg/ml

Storage: Room temperature (15°-30° C). Do not refrigerate; crystallization may occur.

Pharmacology

An endogenous nucleoside with antiarrhythmic activity, adenosine slows conduction through the AV node. It can interrupt the reentry pathways through the AV node and

restore normal sinus rhythm in patients with acute PSVT, including that associated with Wolff-Parkinson-White (WPW) syndrome. It decreases peripheral resistance and arterial pressure. Unlike verapamil, systemic hemodynamic effects are minimal and transient. The electrophysiologic effects of adenosine are not blocked by atropine, which indicates a lack of vagal mediation. Adenosine does not convert atrial flutter, atrial fibrillation, or ventricular tachycardia to normal sinus rhythm (with the rare exception of adenosine-sensitive ventricular tachycardia). Modest slowing of ventricular response may occur with atrial flutter or fibrillation.

Pharmacokinetics

Onset: <20 sec
Peak Effect: 20-30 sec
Duration: 3-7 sec
Interaction/Toxicity: Prolonged bradycardia may occur in patients with toxic concentrations of calcium channel blockers; antagonized competitively by methylxanthines (e.g., theophylline, caffeine); potentiated by blockers of nucleoside transport (e.g., dipyridamole); increased heart rate with nicotine; higher degrees of heart block in the presence of carbamazepine.

Guidelines/Precautions

1. Do not confuse this drug with adenosine phosphate, which is used as adjunctive therapy in the treatment of complications associated with varicose veins.
2. Because of the rapid metabolism, it is imperative to administer the dose rapidly over 2-3 sec. If given at a slower rate, a reflex tachycardia may occur as a result of systemic vasodilation. Negative chronotropic and dromotropic effects are seen only with rapid administration.

3. Adenosine may produce a short first-, second-, or third- degree heart block. Do not give additional doses if patients develop a high-level block.
4. It is not effective in patients receiving methylxanthines, which can completely block the electrophysiologic effects.
5. Use with caution in patients capable of rapid AV conduction. Atrial fibrillation or flutter has been observed in patients receiving adenosine.
6. Reduce doses in heart transplant patients. Donor sinus and AV nodes may have increased response to adenosine compared with recipient nodes or control subjects.
7. Significantly lower doses of adenosine should be administered in patients receiving dipyridamole. Initial doses should not exceed 1 mg.
8. Use with caution in patients with asthma. It may produce bronchoconstriction.
9. ECG monitoring is essential to determine conversion to normal sinus rhythm or AV block and detect new arrhythmias.
10. It is contraindicated in patients with second-degree or third-degree AV block or sick sinus syndrome, except where a pacemaker has been placed.

Principal Adverse Reactions

Cardiovascular: Palpitations, chest pain, hypotension, bradycardia, arrhythmias,
Pulmonary: Dyspnea, hyperventilation
CNS: Headache, dizziness, blurred vision, numbness, irritability
GI: Nausea, metallic taste, tightness in throat
Dermatologic: Flushing

ALFENTANIL HCL (ALFENTA)

Use(s): Analgesia, anesthesia

Dosing: Analgesia: IV/IM, 250-500 μg (5-10 μg/kg)
Induction: IV bolus, 50-300 μg/kg; or infusion, 0.5-15 μg/kg/min for ≤20 min. Titrate dose to patient response. To avoid chest wall rigidity administer muscle relaxant simultaneously with induction doses.
Anesthesia supplement: IV bolus, 10-100 μg/kg; infusion, 0.05-1.25 μg/kg/min
Sole anesthetic: IV, 500-2000 μg/kg (total dosage); or infusion, 1.25-8 μg/kg/min
Epidural: Bolus, 500-1000 μg (10-20 μg/kg); infusion, 100-250 μg/hr (2-5 μg/kg/hr)

Elimination: Hepatic

How Supplied: Injection, 500 μg/ml

Storage: Room temperature (15°-30° C)

Dilution for Infusion:

IV, 10 mg (20 ml) alfentanil in 250 ml of D_5W or NS (40 μg/ml)

Epidural, 1.5 mg (3 ml) alfentanil in 150 ml local anesthetic or (preservative-free) NS (10 μg/ml)

Pharmacology

A potent opioid analgesic with rapid onset and short duration of action, alfentanil produces a deep level of analgesia and attenuates the hemodynamic response to surgical stress. Like most opioids, it reduces sympathetic tone and may produce bradycardia (probably by stimulation of the vagal nucleus in the medulla), especially in conjunction with nonvagolytic neuromuscular blocking agents (e.g.,

vecuronium) or in the absence of an anticholinergic. Induction doses produce respiratory depression and decreases in blood pressure secondary to peripheral vasodilation. Alfentanil is associated with more hypotension and bradycardia than either fentanyl or sufentanil. Repeated doses or continuous infusions do not result in a significant cumulation. Alfentanil does not produce any clinically significant changes in cerebral blood flow, cerebral metabolic rate, or intracranial pressure.

Pharmacokinetics

Onset: IV, 1-2 min; IM, <5 min; epidural, 5-15 min
Peak Effect: IV, 1-2 min; IM, <15 min; epidural, 30 min
Duration: IV, 10-15 min; IM, 10-60 min; epidural, 1-2 hr
Interaction/Toxicity: Circulatory and ventilatory depressant effects potentiated by narcotics, sedatives, volatile anesthetics, nitrous oxide; ventilatory depressant effects potentiated by amphetamines, MAO inhibitors, phenothiazines, and tricyclic antidepressants; analgesia enhanced and prolonged by α 2 agonists (e.g., clonidine, epinephrine); serum levels and pharmacologic effects of alfentanil increased with concomitant administration of propofol; addition of epinephrine to epidural alfentanil results in increased side effects (e.g., nausea) and prolonged motor block; reduced clearance and prolonged respiratory depression with concomitant use of erythromycin; muscle rigidity in higher doses sufficient to interfere with ventilation.

Guidelines/Precautions

1. Reduce doses in elderly, hypovolemic, high-risk surgical patients and with concomitant use of sedatives and other narcotics.

2. Narcotic effects are reversed by naloxone (IV, 0.2-0.4 mg or higher).
3. Excessive bradycardia may be treated with atropine.
4. Alfentanil crosses the placental barrier, so use during labor may produce depression of respiration in the neonate. Resuscitation may be required; have naloxone available.
5. Epidural alfentanil may cause delayed respiratory depression (up to 8 hr after single dose), pruritus, nausea and vomiting, urinary retention. Naloxone (IV, 0.2-0.4 mg prn or infusion, 5-10 μg/kg/hr) is effective for prophylaxis and/or treatment. Ventilatory support for respiratory depression must be readily available. Antihistamines (e.g., diphenhydramine, 12.5-25 mg IV/IM q6hr prn) may be used for pruritus. Metoclopramide 10 mg IV q6hr prn may be used for nausea and vomiting. Urinary retention may require straight bladder catheterization.
6. Epidural/intrathecal injections should be avoided when the patient has septicemia, infection at the injection site, or coagulopathy.

Principal Adverse Reactions

Cardiovascular: Bradycardia, hypotension, arrhythmias
Pulmonary: Respiratory depression
CNS: Euphoria, dysphoria, convulsions
GI: Nausea and vomiting, biliary tract spasm, delayed gastric emptying
Eye: Miosis
Musculoskeletal: Muscle rigidity
Other: Pruritus

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