Medical Problems Which Influence Choice of Anesthesia


“Dental disease is an ubiquitous disease affecting all races and ages. Patients with dental disease who are otherwise healthy present no special problem in anesthetic management. On the other hand, patients with dental disease and acquired or congenital systemic disease may present formidable and even life-threatening problems in their anesthetic management....

“This article reviews the normal and pathophysiologic states of pregnancy and several major disease entities; namely, anemia, endocrinopathies, neurologic and neuromuscular disorders, systemic infections, respiratory disorders, and cardiovascular disease.

“Various factors will influence the anesthetic management, the most important being the general health of the patient....

“Normal pregnancy in itself does not contraindicate dental surgery or the specific use of regional, sedation, or general anesthetic techniques. The proper anesthetic management of the pregnant female requiring dental services should not endanger the developing fetus or mother. The proper timing of services and adherence to certain principles in selection of anesthetic agents and techniques is mandatory for good patient care. . . . Elective surgery and major restorative procedures should be deferred to the postpartum period....

“Anesthetic agents and general anesthesia for dental procedures during gestation have been condemned because of potential danger to the fetus with possible increased morbidity and mortality to the mother. During gestation, approximately 50,000 general anesthetists are administered for surgical procedures yearly in the United States....

“The first trimester is the period of organogenesis. It is best to avoid any procedure during this very critical period of fetal life, since any fetal hypoxia may produce deleterious effects upon the developing fetus or cause a possible spontaneous abortion. In an acute and emergent situation, e.g., acute facial cellulitis with hyperpyrexia, whereby regional anesthesia may be contraindicated, the use of general anesthesia is necessary. Several factors are then to be considered. The duration of anesthesia should be minimized. Large amounts of central nervous system depressants, i.e., barbiturates, narcotics, and phenothiazines, are to be avoided. Hypoxia, due to, e.g., respiratory obstruction, respiratory depression, hypotension, or decreased cardiac output must be avoided.

“For the normal pregnant . . . patient, the second trimester is the best time for dental treatment....

“Regional anesthesia is the technique of choice for the pregnant patient. The use of inhalation analgesia (nitrous oxide and oxygen) or intravenous psychosedation technique should be restricted exclusively to the normal . . . patient during the second trimester. Regional anesthesia is necessary whenever analgesia and psychosedation are used. The use of analgesia, psychosedation, or general anesthesia should insure optimal delivery of oxygen both to the fetal and maternal circulation....
"The anemias are of importance because the oxygen-carrying capacity of the blood is reduced in proportion to the RBC reduction...

"A hemoglobin of 10 or a hematocrit of 30 have usually been considered the lower limits of acceptability for elective general anesthesia. The lower value should prompt the clinician to investigate the etiology of the reduction not only for the anesthetic consideration but also the additional problem posed by prolonged hemorrhage following surgical procedures...

"Routine laboratory data of hematocrit alone may not reliably assess the degree of anemia... Both hemoglobin and hematocrit should be determined and the mean corpuscular hemoglobin concentration... will rule out oversights in the evaluation of anemia.

"Diagnosis of anemia prior to treatment is imperative. The primary effort should be to elevate the hemoglobin concentration to an acceptable level... but if this is not feasible, the most expedient method is regional anesthesia with 100 per cent oxygen supplementation. If regional anesthesia is contraindicated, the patient should be hospitalized for treatment....

"The vast majority of patients treated for thyroid disease are regulated and maintained in the euthyroid state by means of medication. The adequacy of treatment may be judged by various laboratory and clinical tests....

"The classical symptoms of the hyperthyroid state typified by nervousness, hypersensitivity to heat, weight loss, tachycardia, weakness and dyspnea.... Consultation with the patient's physician is necessary to ascertain the patient's status and control. The use of ambulatory general anesthesia for these patients is contraindicated. Light psychosedation or nitrous oxide-oxygen analgesia is indicated, although with regional anesthesia vasopressors are contraindicated. Mepivacaine 3 per cent is the agent of choice for the hyperthyroid patient....

"Hypothyroidism (myxedema) presents with symptoms of weakness, fatigue, cold intolerance, bradycardia, menorrhagia and anemia. Hypothyroidism occurs most frequently following thyroidectomy. These patients are very susceptible to narcotic analgesic agents. In addition, all anesthetic agents should be titrated carefully according to patient response to avert severe cardiorespiratory depression. The use of local anesthesia with vasoconstrictor agent is not contraindicated in the hypothyroid patient....

"The symptoms of weakness, fatigability, nausea and vomiting, coupled with hypotension, electrolyte aberrations, and decreased or absent plasma cortisol levels are the presenting symptoms of hypoadrenalism. Adrenal cortical suppression may also result from exogenous administration of steroids for treatment of various medical conditions.

... The exogenous use of steroids with the possibility of adrenal cortical suppression is a more frequent problem confronting the clinician than primary adrenal disease.... These patients will require hospitalization for general anesthesia, but not when regional anesthetic techniques are utilized; however, in these patients caution should be exercised....

"Diabetes mellitus is an inherited endocrine disorder characterized by a metabolic abnormality in the utilization of glucose, whereby protein and fat catabolism must supplement the energy requirement.... The surgical mortality of the controlled diabetic approximates that of the general population. In a diabetic with poor regulation, the risk of surgery in increased. Hypoglycemia is the greatest hazard, as the brain will not tolerate a blood sugar below 60 mg. per 100 ml. Therefore, all techniques should avoid lowering the blood sugar....

"The borderline and mild diabetic patient (those well controlled by small amounts of injectable insulin or an oral antidiabetic agents) need not be hospitalized when general anesthesia is to be used.... When general anesthesia is to be used it should be of short duration. The anesthetic agents should avoid pro-
duction of hyperglycemia, stimulation, and hypoxia or hypotension. General anesthesia for the diabetic patient on a moderate quantity of injectable insulin or any diabetic in poor control warrants hospitalization for the dental procedure.

The basic underlying hazards with patients affected by neurologic and neuromuscular disease are related to the patient's reaction to anesthesia and neuromuscular blocking agents and their capability to sustain adequate ventilatory function.

Epilepsy is the second most frequent neurologic disorder affecting man. The principal problem when sedation or general anesthesia is indicated, is a decreased response to the anesthetic agents with possible drug overdose. These individuals may require a larger anesthetic dose to facilitate a smooth anesthetic induction and a steady maintenance level during the intraoperative period. Thus, close monitoring of vital signs to prevent overt respiratory and cardiovascular depression is mandatory.

The site of abnormality is myasthenia gravis resides in the neuromuscular junction. The disease is characterized by progressive muscle weakness and fatigue, with slight improvement or recovery in the morning but a progressive deterioration throughout the remainder of the day. Progress of the disease varies but but reaches a certain level and may remain static for a period of time.

Regional anesthetic techniques are by far the preferred method, but when sedation or general anesthesia is indicated, the patient should be hospitalized. The hazards of general anesthesia are directly related to the degree of muscular impairment which may compromise respiratory function.

These patients are best maintained with inhalation anesthetic techniques with spontaneous respiration and light surgical planes of anesthesia to prevent undue respiratory depression with its attendant hypercarbia and hypoxia.

Porphyria embraces a number of diseases. The basic pathology involves a genetic derangement in hepatic function with synthesis of porphyrin pigment. Acute intermittent porphyria is one of the few direct contraindications to the use of barbiturates, which may initiate acute attacks, whereby paralysis may result where existing demyelinization is present. Inhalation anesthetic agents, opiate narcotics, and regional anesthetic techniques may be used without precipitating an acute onset.

The muscular diseases (myopathies) are of great anesthetic interest. These patients are best treated in the hospital where pulmonary therapy may be indicated following surgical procedures and anesthesia.

The anesthetic management of the patient presenting with acute infection presents certain potential hazards when general anesthetic agents are used. Relatively high inspired oxygen concentration (14 per cent) with good pulmonary exchange and tissue perfusion are the cardinal principles in anesthetic management. Patency of the airway in the presence of trismus is essential prior to anesthetic induction. If endotracheal intubation or the use of muscle relaxants is indicated, hospitalization may be necessary.

Inhalation anesthetic agents in conjunction with ultrashort-acting barbiturate induction are the suggested methods of choice. The neuroleptic (Innovar), analgesic, or anesthetic technique may not allow adequate muscular relaxation and the duration of anesthesia may be much more prolonged than necessary. Ketamine, because of its psychomimetic property, alpha adrenergic effect, and prolonged duration, is less favorable than the inhalation technique.

Infectious and serum hepatitis have been classically described as two separate virally produced diseases affecting the liver, although presenting with similar symptomatology. All dental procedures are contraindicated in patients with active hepatitis until re-
covery from the disease is adequate.

"The use of anesthetic agents in the presence of anicteric, subclinical, or occult disease is hazardous, since the possibility of producing further hepatocellular damage with termination in acute massive hepatic necrosis is a distinct possibility. Those patients who have experienced minor hepatic disease and have recovered should still be approached with some degree of caution.

"Pulmonary exchange, a factor in oxygen transport, may be limited either by extrinsic or intrinsic factors. The function of the respiratory system is to supply adequate oxygen to the arterial blood to meet the metabolic requirements of body needs and eliminate excess carbon dioxide and maintain it at a physiologic level. Obstruction of the upper airway (extrinsic factor) is of paramount importance, since it decreases effective alveolar ventilation, increases the work of respiration, and decreases pulmonary blood flow. Obstruction within the upper airway decreases tidal volume and markedly decreases elimination of carbon dioxide. The net result is development of hypoxemia and hypercarbia.

"Any limitation is mandibular motion that reduces the vertical dimension is a potential hazard in precipitating obstruction of the upper airway. With surgical or restorative procedures in the presence of severe limitation of opening, hospitalization is necessary for general anesthesia. Nasal endotracheal intubation while the patient is awake may be advisable prior to use of anesthesia to maintain patency of the airway.

"The upper respiratory infection (common cold) is a brief respiratory illness most frequently of viral origin and short duration (5 to 7 days). The use of general anesthesia should be deferred until recovery has occurred. The use of general anesthesia or respiratory depressants is contraindicated during active infection unless urgently needed.

"Bronchitis is an intraluminal abnormality of varied etiology. The degree of irritation of the mucosa is accompanied by hypersecretion and hypertrophy of the glandular epithelium. The increase in secretion and chronic inflammatory response will be aggravated by the use of inhalation anesthetics which are mildly irritating. The anesthetic induction may be stormy with uneven ventilation and stabilization of the anesthetic plane.

"Regional anesthesia is the preferred choice for the patient with severe bronchitis. General anesthesia in these patients is very difficult to manage because of the bronchial irritation which frequently causes coughing and uneven ventilation. When regional anesthesia alone is not suitable, inhalation analgesia or intravenous psychosedation may be used as supplements. Overzealous use of intravenous agents again should avoid respiratory depression.

"Bronchial asthma is considered an allergic or hypersensitive respiratory disease. The clinical symptomatology is similar to bronchitis with the additional symptoms of bronchial smooth muscle spasm. This will decrease the efficiency of ventilation and expiration becomes an active process rather than passive, increasing the work of respiration. These patients react poorly to irritant inhalation anesthetic agents and further, the use of ultrashort-acting barbiturates in the presence of asthma may prove to be hazardous. The suggested technique again is regional anesthesia.

"When general anesthesia is necessary, a smooth anesthetic induction with halothane or nitrous oxide-oxygen may be indicated. The use of dissociative agents, e.g., ketamine, may be considered in certain patients, provided recovery room facilities and proper nursing care are available.

"Obstruction pulmonary disease is usually preceded by chronic bronchitis and characterized by irreversible obstructive disease with symptoms of dyspnea on exertion. Pulmonary tests will demonstrate the effects of emphysema upon ventilation. The mar-
gin of error possible in the anesthetic management in the emphysematous patient is small....

"Severely emphysematous patients may live in a state of chronic hypoxia with an associated hypercarbia. The prolonged hypercarbia readjusts the respiratory center so that the basic stimulus to respiration is hypoxia. If the anesthetic gas mixture has a large oxygen fraction, as in analgesia technique (N₂O-O₂), the increase in arterial oxygen tension may take away the hypoxic respiratory drive. Prolonged apnea may ensue. This ominous complication may occur in spite of the most meticulous anesthetic management and suggests that patients with severe chronic obstructive pulmonary disease should be anesthetized with local anesthesia, but not in the dental office....

"There are two general types of restrictive pulmonary disease: that associated with neuromuscular or muscular disorders and restrictive disease with decrease in compliance.... The obese patient, because of the decreased chest compliance, may obstruct very easily and maintenance of an airway is difficult even in the awake patient. Thus, the use of intravenous psychosedation and general anesthesia should assure patency of the airway. The avoidance of cardiovascular and respiratory depression with hypotension and hypoventilation is mandatory.

"The normal function of the heart is essential to provide the kinetic energy to maintain the required perfusion of tissue with oxygenated blood and other intravascular components to maintain organ and tissue homeostasis....

"Atherosclerotic heart disease, coronary heart disease, coronary artery disease, and ischemic heart disease are terms that have been used to describe the same cardiac condition, the net results of which is inadequate perfusion of the myocardium.... The degree of myocardial ischemia secondary to atherosclerosis is directly related to the adequacy of the collateral coronary circulation....

"Anesthetic management of the cardiac patient demands the utmost care to prevent myocardial hypoxia, irrespective of its cause. This hypoxia will occur when the myocardial oxygen demand exceeds its availability. The margin of safety and error of anesthetic miscalculation will be determined by the severity of myocardial disease and its remaining cardiac reserve....

"The administration of general anesthesia to patients with severe heart disease on an outpatient basis is to be avoided. When general anesthesia, regional anesthesia or psychosedation is necessary for prolonged procedures, an individual should be hospitalized....

"Hypotension in the presence of atherosclerotic heart disease may be lethal. Maintenance of blood pressure is necessary to maintain adequate perfusion of vital organs, i.e., the heart and the brain. The patient with atherosclerosis has sufficient artery disease as blood flow is dependent upon adequate hydrostatic pressure. Thus, the coronary circulation is dependent on adequate arterial blood pressure. Any reduction in systemic vascular pressure will reduce coronary blood flow resulting in myocardial ischemia....

"Anesthetic agents used in the ischemic heart patient must avoid depression which may cause hypoxia, hypoventilation, hypotension or hypertension....

"The intravenous techniques, because of ease of administration, short duration, and apparent stability of the vital signs, have attained popular and clinical acceptance. ... Numerous investigations have demonstrated the ultrashort-acting barbiturates have a prolonged depressant effect on the respiratory center and alter the cardiovascular parameters....

"The normal healthy patient with a well perfused myocardium is capable of maintaining cardiac output to compensate for the reduction of vascular resistance by an increase in either cardiac rate or stroke volume, or both parameters. The cardiac patient may be unable to compensate for this reduction in peripheral vascular resistance. The
reduction may be intensified if the patient is on long-acting vasodilators. Thus, small alterations in cardiorespiratory dynamics may cause severe myocardial depression.

“The narcotic analgesics, meperidine in particular, will cause depression of respiration and the hypotension. The etiology of hypotension is still undefined but it may result from the reduction of vascular resistance by the action of histamine. The degree of hypotension is related to the dosage, but is also related to the rapidity of drug administration. These changes in the respiratory and cardiovascular parameter will further reduce coronary flow which may precipitate severe myocardial ischemia and acidosis.

The phenothiazine drugs have been used more in combination with other agents as barbiturates and narcotics than singularly as premedicants and psychosedatives.... The phenothiazine drugs have received wide use combination with narcotic analgesia because they intensify and prolong the effect of narcotic analgesia. The frequency of hypotension and cardiac arrhythmias warrants the cautious use of these agents in the cardiac patient in these combinations....

“The butyrophenones or neuroleptic anesthetics have been used in dentistry. These tranquilizers produce a sense of dissociation which is pleasant and acceptable to the patient.... The prolonged duration of action and possible cardiovascular depression by the alpha adrenergic blockade may prohibit the use of these agents, for the ambulatory cardiac patient.

“Ketamine, a cyclohexanone derivative, is a non-barbiturate anesthetic which produces a cataleptic state. This agent should not be used for the cardiac patient because of the marked elevation of blood pressure and tachycardia produced by this drug.

“Diazepam, a benzodiazepine tranquilizer, is a drug which may cause the least depression of respiration and cardiovascular function. The drug is titrated slowly to obtain sedation without loss of consciousness....

“The clinical symptoms of hypertension may exist when resting systolic blood pressure is 160 mmHg and the diastolic pressure is 90 mmHg or greater. The disease may involve organ systems, heart, brain, liver, and kidney.... The major problem in the anesthetic management of the hypertensive patient is prevention of marked alteration in blood pressure or depression attended by hypotension....

“A well-administered anesthetic should not cause marked alteration in blood pressure either in the normotensive or hypertensive individual. The hypertensive patient is very sensitive to changes in the blood pressure and may overreact by significant alteration in blood pressure. The antihypertensive medication should be maintained and, should hypotension occur, prompt drug therapy is necessary to maintain the blood pressure and adequate perfusion of cerebral, coronary, and cervical tissue....

“Surgery and anesthesia are contraindicated for 3 to 6 months following myocardial infarction....

“The patient with this history has a 50 times greater chance of re-infarction with anesthesia and surgery than an individual with no previous history of myocardial infarction.... Regional anesthesia is the method of choice although, if intravenous psychosedation is necessary, small amounts of diazepam of 0.04 mg to 0.08 mg per kg administered slowly may be used.

“The cyanotic group of lesions is associated with marked right-to-left shunt. This shunting of unoxygenated venous blood of the right side into the left ventricular outflow tract mixes with the oxygenated blood, producing cyanosis. This class of patients, because of age and possible complication in reversal of the shunt in the noncyanotic from left-right to right-left, should not receive general anesthesia on an ambulatory basis....
“The goal of anesthetic management is to provide a surgical plane of anesthesia to accomplish the necessary surgery with minimal physiologic and emotional disruption. Knowledge of the pathophysiology of the diverse processes together with the effects of medications is mandatory in the selection of anesthetic agents and anesthetic techniques.”

Alphadione (Althesin): A New Induction Agent
“The search for the ideal induction agent still continues. . . . Alphadione, better known as Althesin, is a new steroid intravenous induction agent. . . . Several advantages have been claimed in favour of Althesin as an induction agent over the commonly used barbiturates and the early steroids. Among the advantages cited are pleasant and rapid onset of sleep, short duration and minimal after effects, suppression of laryngeal reflexes, and relaxation of the muscles of the airway, lack of irritation of the blood vessels and a high therapeutic index. In this communication we report our experiences with Althesin as an induction agent.

“Fifty-seven patients . . . were the subjects of study . . . undergoing elective operations of short duration . . . Twenty-five patients received diazepam 10 mg intramuscularly one hour before operation. After establishing an intravenous infusion of dextrose 5 per cent in Ringer's lactate . . . anesthesia was induced with Althesin in a dose of 0.07 ml/kg given over a period of 10 seconds. . . . The interval between the end of injection and onset of sleep was recorded and vital signs were observed in all patients every minute for five minutes and then every two minutes for another ten minutes.

“In 36 patients succinylcholine . . . was given two minutes after induction to facilitate tracheal intubation. Anesthesia was maintained with nitrous oxide, oxygen and enflurane . . . in 31 patients, with halothane . . . nitrous oxide, oxygen in ten patients and with Althesin, Innovar or narcotics intravenously in 16 patients. At the end of operation the patients were observed for return of orientation . . .

“Vital signs were observed for a period of two hours during recovery and the patients were questioned about dreams or recall during the operation. The site of the Althesin injection was also examined for signs of irritation . . . The results obtained in these patients suggest that Althesin is a satisfactory induction agent with some pharmacological effects similar to but less intense than those of the commonly used barbiturates.

“The rapid recovery of orientation with minimal after effects even when repeated doses of Althesin have been used constitute a major advantage over barbiturates as an induction agent for surgical outpatients . . . The short duration of the hypnotic effect of Althesin is due mainly to its rapid detoxication . . . Short-lived respiratory depression preceded by respiratory stimulation was observed in most patients . . . We have not observed laryngeal or bronchial spasm during or after induction, suggesting that Althesin may be a useful agent in asthmatic patients. Further studies are needed.

“One of the disadvantages of Althesin is its relative insolubility in water . . . Five per cent of our patients had an erythematous rash over the chest which disappeared within a few minutes and seemed to be of no consequence. An increase in the heart rate has been observed in about 60 per cent of our patients . . . The absence of an apparent cause . . . suggest that the increase in the heart rate may be due to a direct action of the drug . . . The use of Althesin for induction of anesthesia in 57 patients showed that it is a satisfactory induction agent. However, with the exception of rapid recovery with minimal after-effects, it has no major advantages over the commonly used barbiturates.”

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