

PREOPERATIVE ANESTHESIA EVALUATION FOR THE LOWER EXTREMITY PATIENT

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INTRODUCTION

The preoperative anesthesia evaluation for podiatric surgical patients differs little from that of any surgical patient. There are a variety of universal factors that must be assessed before any patient enters the operative setting. A systematic approach to this evaluation will identify any underlying risk factors that will potentially complicate the intraoperative and postoperative course.

HISTORY AND PHYSICAL

In the preoperative evaluation of the surgical patient, open communication between the patient, surgeon, and anesthesiologist must exist. The needs of the patient must be accounted for because most surgical patients have preconceived impressions of the surgical setting that lead to stress and fear of the unknown. The surgeon often has requests of the anesthesiologist based on the proposed procedure and length of the case. The anesthesiologist must carry the patient through the complex physiological demands of sedation, induction, and return from anesthesia. This complex interaction must be a concerted event in order to provide a safe and successful operation.

The preoperative anesthesia evaluation is imperative in establishing a relationship between

the patient and anesthesiologist. This allows the anesthesiologist to develop a data base of the patient's past medical and surgical histories, including currently taken medications and allergic reactions to medications. Special attention is paid to previous surgical procedures performed on the patient, as this experience provides information about the patient's response to anesthesia and prior complications. The anesthesia evaluation also provides the anesthesiologist with vital information on the patient's general physical health and ability to handle the stress of surgery and anesthesia. More importantly, the anesthesiologist needs to identify risk factors, based on identifiable cardiovascular risk factors, that predict intraoperative and postoperative morbidity and mortality. In patients with a prior myocardial infarction within six months of surgery, the risk of postoperative MI increases from 0.15% to 30%. Arrhythmias, congestive heart failure, and valvular disease are markers for underlying heart disease, and must be identified preoperatively.

THE CARDIOVASCULAR SYSTEM

The physical examination performed by the anesthesiologist addresses the major organ systems that will be stressed during the delivery of anesthesia. The cardiovascular and respiratory systems are particularly prone to the physiologic stress of anesthesia, as these are the systems by which the

body's major organs are nourished and oxygenated. The perioperative cardiovascular risk factors should be identified prior to surgery. (Table 1)

Table 1

PERIOPERATIVE CARDIOVASCULAR RISK FACTORS

- Identification of Cardiovascular Risk Factors
 - * MI in the previous 6 months
 - * Age is greater than 70 years
- Physical Examination
 - * Important Valvular Aortic Stenosis
 - * S3 gallop or Jugular Venous Distention
- Electrocardiogram
 - * Rhythm other than sinus or Premature Atrial Contractions on last preoperative ECG
 - * >5 Premature Ventricular Contractions/min documented any time before surgery
- General Status
 - * PaO₂ < 60 or PaCO₂ >50mm Hg
 - * K <3.0 or HCO₃ < 20 meq/L
 - * BUN >50 or Cr >3.0 mg/dl
 - * Abnormal SGOT, chronic liver disease or bedridden patient due to non-cardiac causes
- Operation
 - * Emergency operation

Adapted from: Goldman L, Caldera DL, Nussbaum SR, et al: Multifactorial index of cardiac risk in non-cardiac surgical procedures. *N Engl J Med* 297:845-50, 1977.

As patient age increases, so does the incidence of cardiovascular disease. The stress response to surgery, as manifested by endogenous catecholamine release, further depresses the myocardial response in the already compromised patient. The diabetic patient is particularly prone to early onset coronary artery disease, and a large number of these patients, although asymptomatic, demonstrate ECG evidence of a prior silent myocardial infarction. Hypertensive cardiovascular disease also correlates with postoperative mortality, as untreated hypertension may lead to myocardial ischemia and infarction. In addition, chronic anemia, hypercholesterolemia and a history of cigarette smoking all place the surgical patient at increased risk for cardiovascular complications.

THE RESPIRATORY SYSTEM

Assessment of the respiratory system is important in identifying patients at risk for perioperative complications associated with the delivery of anesthesia, and in minimizing the risk of postoperative pulmonary complications. The safe delivery of a general anesthetic is dependent upon adequate uptake and exchange of both the volatile or gaseous anesthetic and oxygen. Adequate pulmonary function is also necessary to maintain a homeostatic acid-base balance intraoperatively.

A history of dyspnea warrants further preoperative examination. Obstructive causes of dyspnea include asthma, bronchitis, and emphysema, while cardiopulmonary causes include pulmonary hypertension and edema. The obese or anemic patient may also present with varying degrees of dyspnea. Patients with chronic bronchitis or a history of smoking are susceptible to pulmonary infections, and often present with a nonspecific cough. An acute respiratory tract infection should postpone elective surgery due to the risks of airway obstruction and postoperative atelectasis or pneumonia. Patients with pre-existing lung disease such as tuberculosis or bronchogenic carcinoma may present with hemoptysis. Therefore, a preoperative chest roentgenogram is indicated in any patient with a history of pulmonary dysfunction.

In addition to the cardiorespiratory examination, the anesthesiologist must also inquire about any significant history of hepatic, renal, gastrointestinal, endocrine, or hematologic conditions which could potentially affect the outcome of surgery or complicate anesthesia. The goal of the preoperative anesthesia evaluation is to identify whether or not the patient is at their optimal health prior to surgery, and to address any abnormalities prior to entering the operating room.

CHOOSING AN APPROPRIATE FORM OF ANESTHESIA

When choosing the type of anesthesia for a particular patient, the requirements of the proposed procedure and the anesthetic risks specific for that particular patient must be taken into consideration. In general, the less invasive the anesthetic, the less chance of anesthetic complication. In the

young, healthy patient undergoing forefoot or uncomplicated rearfoot surgery of short duration, it is most favorable to avoid a general anesthetic, as mild sedation with the use of a local anesthetic will usually suffice. Similarly, in high risk patients whose ability to tolerate the physiologically demanding stress of a general anesthetic, a regional or local form of anesthesia is more appropriate. A regional or local form of anesthesia should also be used in procedures where the risk of a general anesthetic is greater than the benefit of surgery.

Prolonged major reconstructive surgeries, such as midfoot and rearfoot arthrodesing procedures, requiring skeletal muscle relaxation, or the use of a pneumatic thigh tourniquet for hemostasis, usually require the use of a general anesthetic. Infant and pediatric patients also fall into this category, as communication between the anesthesiologist and patient is compromised, and the need for a general anesthetic is apparent.

Patients undergoing emergency podiatric surgery (life or limb-threatening infection, open fracture, vascular compromised trauma) present as a more complex situation, in that there is often little time to optimize the patient's health prior to surgery. In addition, these patients are often categorized as full-stomach patients, and the risk of aspiration precludes the use of heavy sedation. Therefore, the choice of anesthesia is made through an assessment of the relative patient risk, invasiveness of the procedure, and urgency of surgery.

THE ELECTIVE SURGICAL PATIENT

The majority of podiatric surgery is elective, of short duration, and involves forefoot structures. Surgery of this type rarely requires skeletal muscle relaxation, and can be safely performed with the aid of an ankle tourniquet. These patients will benefit through the use of an appropriately performed local anesthetic block.

A thorough understanding of the anatomy of the peripheral nerves of the foot is imperative in performing an effective local block, and will facilitate the efficient use of anesthetic solution. The use of fine bore needles and small volume syringes will reduce the pain of injection, and the need for sedatives and narcotics. Proximal injec-

tion of a local anesthetic prior to the onset of surgery, even in cases performed under general anesthesia, has been shown to reduce postoperative pain by inhibiting the pain pathway prior to tissue insult and nerve stimulation.

The appropriate use of epinephrine and anatomic dissection will often provide adequate hemostasis, and eliminate the need for a tourniquet. The occlusion of tissue secondary to prolonged tourniquet inflation causes ischemic pain which is often unrelieved by intravenous narcotic administration. The stress response to pain causes a release of endogenous catecholamines into the bloodstream, which further stresses the myocardium in already compromised patients. In addition to pain, tourniquets cause hypoxia of tissues and the build-up of toxic metabolic products which when released into the bloodstream upon deflation, decreases the pH of the blood causing metabolic acidosis. Therefore, a tourniquet should be used in a high risk patient only when necessary. The use of a tourniquet for convenience should be discouraged.

THE HIGH RISK SURGICAL PATIENT

High-risk podiatric surgical procedures constitute a special concern for the anesthesiologist. These patients are often hemodynamically unstable and have a limited ability to compensate for myocardial depression. Intraoperative ischemic events can induce arrhythmias and hypertension, thus dictating the importance of close invasive intraoperative monitoring. Aggressive monitoring of blood pressure, heart rate and rhythm, electrolyte balance, urine output, and tissue oxygenation, will aid in circumventing anesthesia-related complications.

The postoperative period is also of specific concern, as most complications will usually occur during the first ninety-two hours following surgery. The onset of pain with the release of endogenous catecholamines, the hyper-coagulable state with platelet adhesiveness, anemia from blood loss, and the release of vasoactive mediators of tissue repair, all contribute to the development of postoperative cardiovascular complications. High risk surgical patients should be closely monitored postoperatively, and often need the attention of a telemetry or intensive care unit.

SUMMARY

The podiatric surgical patient poses no greater anesthesia risk than other surgical specialties, and the majority of surgery performed is elective. However, the same cardiovascular risk factors apply for all surgical patients, and these must be identified and treated preoperatively in order to optimize the patient's ability to compensate for variations in vital function. The factors which influence perioperative anesthesia complications are identifiable through a thorough history and physical examination.

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