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Guideline Statement for Treatment of Anaphylactic Reaction in the Surgical Patient

Introduction

Anaphylaxis, also referred to as an anaphylactic reaction, is a response to an allergen, such as latex, that is classified as a Type I hypersensitivity reaction.¹ The onset of anaphylaxis can be rapid, requiring the surgical team to act quickly to provide definitive treatment to stabilize the patient's condition.

The following is a brief review of anaphylaxis, as it applies to the surgical patient and the role of the Certified Surgical Technologist (CST) in the treatment of the patient. The information is presented with the understanding that it is the responsibility of the health care facility (HCF) to develop, approve and establish policies and procedures for treating anaphylaxis in the surgical patient, according to established HCF protocols, state and federal medical laws. HCFs should develop policies and procedures regarding the duties of each person on the surgical team related to treating the patient for an anaphylactic reaction.

Assumption

The emphasis of this Guideline Statement and information contained herein is on treatment of the patient who is experiencing anaphylaxis during surgery. The immediate treatment of the individual in the field varies from the treatment the patient receives in the operating room. Therefore, healthcare providers are referred to reviewing on a personal basis the basic first-aid treatment of anaphylaxis that occurs outside of the HCF.

AST Guideline Statement

CSTs are qualified to identify the signs and symptoms of an anaphylactic reaction and communicate this information to the surgical team. Additionally, they are qualified to assist the surgical team in the treatment of the patient under the direct supervision of the surgeon.

Pathophysiology of Anaphylaxis and Anaphylactoid Reactions

Anaphylaxis is a type of vasogenic shock that can present a range of signs and symptoms from mild to acute respiratory distress accompanied by circulatory shock and collapse.⁷ The anaphylactic response is mediated by a Type I hypersensitivity reaction in which IgE antibodies react to the allergen. This causes the release of the primary mediators of anaphylaxis into the circulatory system: histamine, leukotrienes, BK-A, and platelet-activating factor.⁹

Histamine, in combination with additional vasodilator substances, causes systemic vasodilation, pooling of the blood in the peripheral circulatory system, and increased capillary permeability.³ The peripheral and visceral edema produce hypovolemia and shock, whereas arteriolar vasodilation dramatically decreases the systemic vascular

resistance. Due to the peripheral pooling of blood, the blood pressure can dramatically decrease in a very short span of time.

The vascular complications are accompanied by respiratory complications, including airway constriction, due to swelling of the smooth muscles in the airway tract, bronchospasm, and angioedema. Angioedema of the pharynx, larynx and trachea produces upper airway obstruction, whereas bronchospasm and mucosal edema produce lower airway obstruction. Histamine tends to cause constriction of the large airway tracts and leukotrienes affect the smaller peripheral airways. The airway obstruction can be just as life threatening as a result of the laryngeal edema and/or bronchial spasm. Death usually occurs due to asphyxiation and/or circulatory shock.⁹

Anaphylactoid reactions, as the name indicates, resemble anaphylaxis; however, the reaction does not depend on IgE antibodies reacting with an allergen.⁹ A particular drug can be responsible for causing the direct release of histamine from the mast cells into the circulatory system or activate complement. The key point to remember is that anaphylactic and anaphylactoid reactions exhibit similar signs and symptoms, and are equally life threatening. The incidence of anaphylaxis and anaphylactoid reactions in the patient under anesthesia is approximately one in 4,500 and has a risk of mortality of 3% to 6%.¹²

The two primary causes of true anaphylaxis in the patient under anesthesia are muscle relaxants and latex allergy with muscle relaxants.⁵ The estimated incidence of muscle relaxant-induced anaphylaxis is one in 6,500 patients and accounts for approximately 70% of perioperative anaphylactic reactions.⁹ The muscle relaxants indicated in clinical studies most responsible for reactions include succinylcholine, atracurium, vecuronium, and pancuronium.⁶

Latex allergy is the second most common cause of anaphylaxis during anesthesia.¹⁵ The reactions involve a direct IgE-mediated immune response to the polypeptides in natural latex. Patients with spina bifida, spinal cord injury, and congenital abnormalities of the GU tract are at a high risk for latex allergy.¹⁰ By 2000, latex was reported to account for approximately 16.6% of anaphylactic reactions during surgery.⁶ The incidence of latex allergy in pediatric patients is approximately one in 10,000.⁹ Treatment of the patient under anesthesia who experiences anaphylactic reaction to latex is the same as other forms of reaction. Individuals are referred to the *AST Guideline Statement on Latex Allergy* for additional information.

After muscle relaxants and latex allergy, antibiotics are targeted as the third leading cause of anaphylactic reactions in the surgical patient.⁶ Drug allergies in the surgical patient are primarily due to antibiotics, mainly β -lactam antibiotics, including the penicillins and cephalosporins. Sulfonamide allergy is also fairly common in surgical patients. Keeping the incidence of drug-allergy-induced anaphylaxis in the surgical patient in perspective, up to 2% of the population is allergic to penicillin, but approximately only 0.01% of penicillin administration results in an anaphylactic reaction.⁹

The antibiotic commonly used for antibiotic prophylaxis in the surgical patient is vancomycin and it is commonly associated with anaphylactoid reactions consisting of pruritus, erythema of the head and upper torso, and arterial hypotension.

Clinical Signs and Symptoms

The most common clinical features of anaphylaxis during anesthesia are cardiovascular and cutaneous signs and symptoms.⁹ However, cutaneous signs can be difficult to identify, because the patient is draped. Additionally, while the patient is under anesthesia, there is an absence of symptoms that the patient is experiencing an anaphylactic reaction. The majority of surgical anaphylaxis occurs during the induction period when muscle relaxants, sedatives, and opiates are administered.⁶ Latex allergic reactions tend to occur during maintenance anesthesia with the possibility of a 30- to 60-minute delay.

Table 1 lists the clinical signs and symptoms of anaphylaxis.

Table 1: Clinical Signs and Symptoms of Anaphylaxis¹¹

Body System	Signs and Symptoms
Integumentary	Urticaria , pruritus, facial edema
Cardiovascular	Hypotension , tachycardia
Respiratory	Bronchospasm , dyspnea, pulmonary edema, hypoxia

Bolded words indicate primary signs for patients under general anesthesia.

Treatment in the Operating Room

When an anaphylactic reaction occurs, the first two immediate steps to take are discontinuation of drug administration and administration of 100% oxygen.⁸

Table 2 provides the recommended drug therapy and other measures to be taken for treating the patient.

Table 2: Treatment of Anaphylactic Reactions

Drug or Other Treatment	Drug Action	Dosage
Diphenhydramine (Benadryl®)	Antihistamine: H ₁ blocker	.2-.5 mg/kg IV
Epinephrine	Vasoconstriction; relax bronchial smooth muscles	Dose depends on the severity of the reaction, but common dosage is 0.3 to 0.5 mL of 1:1000 IV, repeated at 5-10 minute intervals. ¹²
Aminophylline ¹⁴	Relax bronchial smooth muscles to treat bronchoconstriction	5-6 mg/kg IV over 20-30 minutes
IV fluids: Lactated Ringer's	Treat hypovolemia and prevent circulatory collapse and shock	
Ranitidine	Antihistamine: H ₂ blocker	50 mg IV

Hydrocortisone or methylprednisolone	Anti-inflammatory	Hydrocortisone: up to 200 mg IV Methylprednisolone: 1-2 mg/kg IV
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Note: Over time, aminophylline is being replaced by PROVENTIL ® (Albuterol).¹¹

Competency Statements

Competency Statements	Measurable Criteria
<p>1. CSTs are qualified to handle and administer medications and solutions in the O.R. under the direct supervision and order of the surgeon, when treating a patient for anaphylactic reaction.</p> <p>2. CSTs can identify the signs and symptoms of anaphylactic reaction and communicate this information to the surgical team.</p>	<p>1. Educational standards as established by the <i>Core Curriculum for Surgical Technology</i>.²</p> <p>2. Medications, including calculating dosages and conversions, and preparation and management of medications and solutions, and anesthesia techniques are included in didactic studies as a surgical technology student.</p> <p>3. Anaphylactic reaction and treatment of the surgical patient undergoing a reaction are included in the didactic studies as a surgical technology student.</p> <p>4. Handling and administration of medications and solutions are practiced with skill check-off exams in the mock O.R. setting as a surgical technology student.</p> <p>5. Surgical technology students handle and administer medications and solutions during clinical rotation, and are evaluated by preceptors and instructors on the proper handling and administering of the medications and solutions.</p> <p>6. CSTs perform the handling and administration of medications and solutions in the perioperative setting as practitioners.</p> <p>7. As practitioners, CSTs perform patient care duties by assisting the surgeon and surgical team during emergency situations,</p>

	<p>including anaphylactic reaction.</p> <p>8. CSTs complete continuing education to remain current in their knowledge of medications and solutions.</p> <p>9. CSTs complete continuing education to remain current in their knowledge of surgical emergencies and treatment of the patient in the O.R.</p>
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References

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