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## **Guideline Statement for the Treatment of Disseminated Intravascular Coagulation**

### **Introduction**

Though a rare occurrence in the perioperative setting, disseminated intravascular coagulation (DIC) is a syndrome that the CST should understand and be prepared to assist in treating.

AST developed the following Guideline Statement to provide support to health care facilities (HCF) to aid in the reinforcement of the recognition of DIC and methods of treatment in the perioperative setting. The purpose of this Guideline Statement is to provide information that health care providers in the perioperative setting can use to develop and implement policies and procedures for the treatment of DIC. The guideline is presented with the understanding that it is the responsibility of the HCFs to develop, approve and establish policies and procedures for treating DIC according to established HCF protocols, state and federal medical laws.

### **AST Guideline Statement**

The Certified Surgical Technologist (CST) is qualified to assist in the methods used to treat DIC and its underlying causes in the surgical setting under the direct supervision of the surgeon

### **Pathology**

DIC is a complicated systemic disorder of the body's hemostatic process that involves a combination of hemorrhaging and microvascular coagulation. It is most often referred to in terms of being a hemorrhagic disorder, due to the difficulties associated with bleeding; however, the complications that occur with the microvascular clotting must be also be recognized as being associated with true DIC.<sup>6</sup>

DIC is a repeating cycle of clot formation and fibrinolysis of the clot, leading to the depletion of platelets and coagulation factors, including the constant release of anticoagulants.<sup>3</sup> As the level of the platelets decreases, systemic microvascular coagulation occurs in the bloodstream and within the organs of the body. At the same time, the depletion of the platelets and coagulation proteins results in the inducement of severe bleeding.

DIC can range from low-grade with minimal symptoms and complications to fulminate DIC that presents with life-threatening bleeding and coagulation abnormalities.<sup>6</sup>

## Causes

DIC is an acquired disorder that occurs in a variety of clinical conditions. The common causes are listed in Table 1. Infectious disease, particularly septicemia, is the most common clinical condition associated with DIC.<sup>4</sup> Most microorganisms can cause DIC, but bacterial infection is most frequent. Contrary to popular belief and information, DIC seems to occur as often in patients with gram-positive sepsis as in those with gram-negative sepsis.<sup>4</sup> Approximately 10%-20% of patients with gram-negative bacteremia display evidence of DIC.<sup>1</sup>

Another clinical occurrence commonly associated with the development of DIC is severe trauma, in particular, trauma to the brain tissue. A combination of factors contributes to triggering DIC, including the release of fat and phospholipids from tissue into the circulation, hemolysis, and endothelial damage.<sup>4</sup>

DIC is a common complication associated with abruption placentae and amniotic-fluid embolism, occurring in more than 50% of patients who experience these obstetrical conditions.<sup>4</sup> These conditions may cause fulminant DIC, but the DIC tends to be a short-term condition, once the underlying disorder has been treated.

**Table 1: Common Clinical Conditions Associated with the Cause of DIC**

### Trauma

- Brain tissue injury
- Fat embolism
- Massive Transfusion

### Cancer

- Leukemia
- Solid tumors

### Obstetrical Complications

- Retained fetus
- Abruptio placentae
- Amniotic fluid embolism

### Immunologic Syndromes

- Hemolytic transfusion reaction
- Anaphylactic reaction
- Transplant rejection

### Vascular Conditions

- Aortic aneurysm
- Giant hemangioma

Gram-positive or Gram-negative sepsis

## Diagnosis

There is no single laboratory test establishing the definitive standard for diagnosing or ruling-out DIC. A combination of tests is performed when a patient presents with a clinical condition known to be a triggering factor. DIC can be diagnosed based on the following<sup>4</sup>:

- Recognition of underlying condition associated with DIC
- Platelet count of less than 100,000 per cubic millimeter or the platelet count rapidly decreases.
- Prolonged prothrombin time
- Prolonged activated partial-thromboplastin time
- Presence of fibrin-degradation products in plasma
- Low plasma levels of coagulation inhibitors, such as antithrombin III

Physical signs<sup>1</sup>:

- Spontaneous bruising
- Petechiae
- GI bleeding
- Profuse bleeding at surgical wound site
- Intracranial bleeding
- Respiratory tract bleeding

## Treatment and Prognosis

The number one management protocol of DIC is treating the underlying disorder or condition, such as sepsis, abruptio placentae, and hemolytic transfusion reaction. By not treating the underlying cause, treatment of DIC will fail. However, treatment modalities will differ according to the presenting symptoms of the patient. For example, a patient who presents with severe hemorrhaging will require supportive treatment that will differ from the patient that presents with microvascular coagulation that can lead to multi-organ failure.<sup>5</sup> The following presents further information as related to the therapeutic management of DIC.

The administration of heparin therapy has been widely debated and remains controversial. Informal studies have been conducted of patients with DIC, but no formal clinical trials have been completed. Available information has not proven that heparin increases the chances of bleeding complications and while some patients benefit from its use, it should be carefully used and administered in low doses. If given, heparin is administered through continuous IV infusion at 300-500 units per hour.<sup>4</sup>

Patients with DIC exhibiting a decreased level of platelet and coagulation factors can be at risk for serious bleeding when undergoing an invasive surgical procedure. These patients will obviously benefit from infusion of platelet concentrate and plasma. Additionally, these patients will benefit from the administration of vitamin K since they will exhibit a deficiency in the vitamin.<sup>1</sup> Treatment with coagulation-factor concentrates is contraindicated due to the concentrates possibly being contaminated with activated coagulation factors.<sup>2</sup> Concentrates only contain certain coagulation factors and the patient with DIC is deficient in all coagulation factors.<sup>4</sup>

Antithrombin III may be considered for use as part of the overall treatment of the patient with DIC. Antithrombin III is one of the body's natural inhibitors of coagulation and studies have shown its effectiveness.<sup>4</sup> However, its cost prohibits widespread use.

The mortality and morbidity rates of fulminate DIC remain high and are related to the severity of the underlying disorder. The more intense the bleeding, the higher is the risk of patient death occurring. Additionally, studies have shown that the development of DIC in patients with severe sepsis or trauma approximately doubles the risk of death.<sup>4</sup>

### Competency Statements

Competency Statements	Measurable Criteria
<ol style="list-style-type: none"> <li>1. CSTs can assist in the treatment of a patient with DIC under the direct supervision of the surgeon.</li> <li>2. CSTs can serve as runners to deliver blood samples to the lab, blood and blood-products from the blood bank for delivery to the O.R., and communicate blood sample lab results to the O.R.</li> <li>4. CSTs are qualified to locate and set up the blood-warming unit.</li> <li>5. CSTs can assist in the documentation, such as the clinical record and patient's chart.</li> </ol>	<ol style="list-style-type: none"> <li>1. Educational standards as established by the <i>Core Curriculum for Surgical Technology</i>.<sup>3</sup></li> <li>2. The subject area of transfusion, blood, and blood-products is included in the didactic studies as a surgical technology student.</li> <li>3. The treatment protocols for emergency situations, such as DIC, are included in the didactic studies as a surgical technology student.</li> <li>4. Surgical technology students demonstrate knowledge of the transfusion equipment, such as the blood- warming unit through didactic studies.</li> <li>5. As practitioners, CSTs perform patient care duties by assisting the surgeon and surgical team, when a patient is experiencing DIC.</li> <li>6. CSTs complete continuing education to remain current in their knowledge of hemorrhage, transfusion of the surgical patient, and patient care duties as related to transfusion and DIC, including following the policies of the health care facility in completing annual in-service requirements.</li> </ol>

## References

1. Baglin T. Fortnightly review: Disseminated intravascular coagulation: diagnosis and treatment. *British Medical Journal*. 1996; 312: 683-686.
2. Cohn SM, ed. *Complications in surgery and trauma*. Boca Raton, FL: CRC Press; 2006.
3. *Core Curriculum for Surgical Technology*. 6<sup>h</sup> ed. Littleton, CO: Association of Surgical Technologists; 2011.
4. Levi M, Cate HT. Disseminated intravascular coagulation. *N Engl J Med*; 1999; 341(8): 586-592.
5. Porth CM. *Essentials of Pathophysiology: Concepts of Altered Health States*. 3<sup>rd</sup> ed. Philadelphia, PA: Lippincott Williams & Wilkins; 2010.
6. Townsend CM, Beauchamp RD, Evers, BM, Mattox KL, eds. *Sabiston Textbook of Surgery: The Biological Basis of Modern Surgical Practice*. 19<sup>th</sup> ed. Philadelphia, PA: Saunders; 2012.