Disseminated Intravascular Coagulation (DIC) as a Major Risk of Mortality, its Diagnosis and Treatment

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Abstracts: *Disseminated Intravascular coagulation (DIC),also known as thrombohemoragic syndrome, represents a universal disorder of hemostasis, characterized by disruption of peripheral blood coagulation.*

In DIC, spontaneous of microthrombi occurs within blood vessels,leading to impaired microcirculation and organ dysfunction, which may progress to acute organ failure .DIC is a life-threatening syndrome ,that can be triggered by various diseases and pathological conditions and it frequently ends in mortality (20%-50%). It is crucial to understand its prophylaxis and initiate timely therapy.

A major error is the transfusion of massive or preserved blood. It is recommended to transfuse freshly frozen plasma,rheopolyglucin,albumin,erythrocyte mass and platelet mass.

Keywords: Disseminated, Intravascular,Hemostasis,Erythrocyte mass,Fresh Frozen Plasma Disseminated Intravascular Coagulation (DIC) is a universal disorder of hemostasis (blood coagulation factors), characterized by impaired coagulation in peripheral blood. [1,6]

Morphologically, it is based on the spontaneous formation of multiple microthrombi within the blood vessels, accompanied by aggregation (clumping) of fibrin (a blood coagulation factor) and blood cells. This leads to impaired microcirculation in organs and tissues, resulting in structural and functional changes. [2,4] The prognosis is often poor and frequently ends in death. In cases of sepsis, DIC syndrome is associated with a significantly higher mortality rate compared to trauma-induced DIC syndrome. [3,5,7]

The causes of DIC syndrome can be divided into several groups:

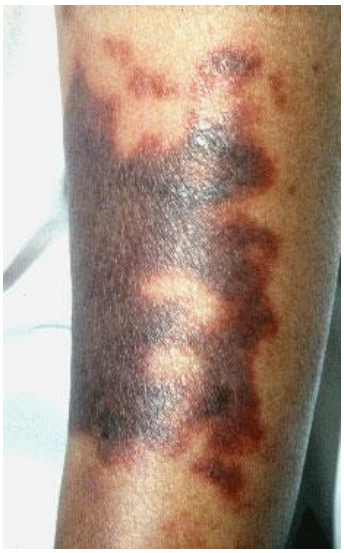
- Developing as a result of acute infectious-septic processes;
- Induced by massive blood transfusions (e.g., in cases of hemorrhagic shock, trauma, or chronic bleeding);
- Caused by acute poisoning (most often with heavy metal salts, alcohol, or chemical substances);
- Immune and immune complex-related causes (e.g., systemic lupus erythematosus, active hepatitis, liver cirrhosis);
- Triggered by allergic reactions (e.g., venomous snake bites and others).

DIC syndrome can also be caused by cancer, burns, frostbite, and so on.

Phases of Disseminated Intravascular Coagulation (DIC) Syndrome:

- First Phase – Hypercoagulation: Increased coagulation activity; the blood clots earlier than normal.
- Second Phase – Hypocoagulation: Decreased coagulation activity; the blood clots later than normal.
- Third Phase – Fibrinolysis: This is the manifest (clinical) phase, characterized by intense bleeding.

Fourth Phase – Resolution: The intensity of bleeding decreases, but thrombolytic processes are still present, which may lead to liver, kidney, and rarely, respiratory failure.
Clinical Symptoms:



The clinical presentation of DIC syndrome is determined by the underlying disease, the disturbances in the blood coagulation system, and the resulting organ dysfunction. The more acute the DIC syndrome, the more intense the bleeding.

DIC tends to have a subacute course in cases of viral hepatitis and pancreatitis, due to destructive processes in the organs.
Differential diagnosis should be made with:

- Thrombocytopenic purpura
- Hemolytic-uremic syndrome

In the early clinical picture of DIC syndrome, the following signs are noteworthy: Fever up to 39°C, accompanied by sweating, dyspnea, and in some cases, diarrhea and vomiting, which can lead to dehydration. The patient quickly becomes incoherent or unresponsive. Hemorrhagic shock may develop. Arterial and venous pressure drops critically. Acute organ failure occurs. Due to impaired microcirculation in the organs, pulmonary edema may develop. In some cases, a shock lung condition arises — a thrombus enters the lungs via the venous system.Microthrombi damage the mucosal lining of the stomach and duodenum, leading to gastrointestinal bleeding (Melena).
Diagnosis:

Clinical and biochemical blood analysis is required. A coagulogram is performed. A right shift is observed in the leukocyte formula.The platelet count is reduced.
The coagulogram findings are significant: Fibrinogen levels are decreased; D-dimer is elevated; INR (International Normalized Ratio) is elevated; Clotting time is prolonged.

Treatment:

- Elimination of the underlying cause
- Anti-shock measures — restoring blood volume and correcting its composition. For this purpose, Rheopolyglucin, fresh frozen plasma, albumin, platelet and erythrocyte mass

transfusion, and cryoprecipitate are used. In cases of DIC syndrome caused by purulent (infectious) processes, antibiotics are administered alongside heparinization.

To stop internal organ bleeding, radical surgical methods (e.g., organ amputation) may be used in severe cases.

For gastrointestinal bleeding, fibroscopy is used to localize and manage the source.

Prevention: Unjustified hemotransfusion with massive and preserved blood is considered a big mistake.

It is unjustified to transfuse 250-500 ml of blood after surgery unless there is a serious indication. It is advisable to use fresh frozen erythrocyte mass.

Conclusion:Thus, disseminated intravascular coagulation (DIC) is one of the very serious pathological syndromes that develops in many diseases and terminal conditions. It is characterized by activation and subsequent depletion of the coagulation and fibrinolytic systems, which leads to disruption of organ microcirculation and dysfunction. Its prevention and timely therapy are necessary, although the mortality rate remains quite high (up to 20-30%).

References:

1. Disseminated Intravascular Coagulation.www.nhlbi.nih.gov.Retrieved 20 December 2017.
2. Disseminated Intravascular Coagulation (DIC)- Hematology and Oncology. Merck Manuals professional Edition. September 2016. Retrieved 20 December 2017.
3. Levi M. (2007)Disseminated Intravascular Coagulation.Critical Care Medicine.35(90;2191-2195.
4. Gando S, Levi M.Toh Ch (2 June2016) ,,Disseminated Intravascular Coagulation’’.Nature Reviews Disease Primers.2: 16037
5. Davidson’s Principles and Practice of Medicine (19ed) Churchill Livingstone.2002 ISBN0-443-07-36-9.
6. Mkurnaly.ge
7. Haematology:Basic Principles and Practice (6 ed). Elsevier Saunders. 2012. ISBN 978-1437729283.

დისემინირებული სისხლძარღვში და კოაგულაცია, როგორც ლეტალობის დიდი საფრთხე, მისი დიაგნოსტიკა და მკურნალობა

რეზიუმე

დისემინირებული სისხლძარღვში და კოაგულაცია, იგივე თრომბოჰემორაგიული სინდრომი (დიკ) წარმოადგენს ჰემოსტაზის უნივერსალურ დარღვევას, რომლისთვისაც დამახასიათებელია პერიფერიული სისხლის შედედების მოშლა. ამ დროს სისხლძარღვის შიგნით ხდება

მიკროთრომბების სპონტანური წარმოქმნა, რაც იწვევს მიკროცირკულაციის მოშლას და ორგანოთა დისფუნქციას, რამაც შეიძლება მიგვიყვანოს მათ მწვავე უკმარისობამდე.

დიკ სინდრომი რეალურად არის სიცოცხლისათვის საშიში სინდრომი,რომელიც მრავალმა პათოლოგიურმა მდგომარეობამ შეიძლება გამოიწვიოს და არცთუ იშვიათად დამთავრდეს ლეტალობით. (20%-50%). საჭიროა ვიცოდეთ მისი პროფილაქტიკა და დროული თერაპია.

დიდ შეცდომად ითვლება ჰემოტრანსფუზია მასიური და კონსერვირებული სისხლით. მიზანშეწონილია ახალგაყინული პლაზმის, რეოპოლიგლუკინის, ალბუმინის და ერითროციტარული მასის გადასხმა.