Hematological Disorders in Critically ill Patients

Essay

Submitted For Partial Fulfillment of
Master Degree in Intensive Care

by

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2014

بسم الله الرَّحْمَنِ الرَّحِيمِ

"وَقُلْ رَبِّ زِدْنِي عِلْمًا"

صدَق اللَّه الْعَظِيم

سورة طه الاية ١١٤

Acknowledgment

First and foremost thanks to ***Allah.*** *To Whom I relate any success in my life as I owe Him for his great care, support and guidance.*

I have been honored to have worked under the supervision of such distinguished and eminent professors.

I would like to express my deepest gratitude to ***Prof. Dr. Gehan Fouad*** *Professor of anesthesia and intensive care medicine faculty of medicine, Ain shams university for her valuable assistance sincere advice and for spending with me much of her precious time which gave me the push and the well to give always my best throughout this work.*

Words could not express the feeling of gratitude and respect I carry to ***Dr.Walid Nofal*** *and* ***Dr.Mohamed Saleh*** *lecturers in anesthesia and intensive care medicine faculty of medicine, Ain shams university, who had tirelessly and patiently supervised this work. It has been a pleasure to proceed with this research under their supervision.*

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ABC	Anemia and blood transfusion in the critically ill
ADAMTS13	A disintegrin and metalloproteinase with a thrombospondin type1 motif, member 13
ADP	Adenosine diphosphate
ASM	Airway smooth muscle
AIDS	Acquired Immune Deficiency Syndrome
AKI	Acute kidney injury
ALL	Acute lymphocytic (lymphoblastic) leukemia
AML	Acute myeloid leukemia
APACHE	Acute Physiology And Chronic Health
APTT	Activated partial thromboplastin time
AT	Antithrombin
BMT	Bone marrow-transplanted
BM	Bone marrow
Bpm	Beats Per Minute
CEL	Chronic eosinophilic leukemia
CLL	Chronic lymphocytic leukemia
CML	Chronic myeloid leukemia
CML, AML	Acute and chronic myelogenous leukemias
CPR	Cardiopulmonary resuscitation
CRBSI	Catheter-related bloodstream infection
CSFs	Colony-stimulating factors
CT	Computed tomography
DCR	Damage control resuscitation

DIC	Disseminated intravascular coagulation
DNA	DeoxyriboNucleic Acid
DVT	Deep venous thrombosis
ECG	Electrocardiography
EPO	Eosinophil peroxidase
EDN	Eosinophil-derived neurotoxin
EPO	Erythropoietin
FDA	Food and Drug Administration
FFP	Fresh Frozen Plasma
Fl	Femtolitere
GCSF	Granulocyte colony-stimulating factor
GI	Gastrointestinal
GM-CSF	Granulocyte-macrophage CSF
GVHD	Graft-vs-host disease
HbC	Hemoglobin c
HbE	Hemoglobin E
Hgb	Hemoglobin
HEUS	Undetermined hypereosinophelia
HEF	Famelial hypereosinophelia
HEN	Neoplastic hypereosinophelia
HER	Reactive hypereosinophelia
HE	Hypereosinophilia
HIF-1	Hypoxia- inducible factor 1
HIT	Heparin-induced thrombocytopenia
HIV	Human Immunodeficiency Virus

HLA	Human Leukocyte Antigen
HSCs	Haematopoietic stem cells
HSCT	Haematopoietic stem cell transplant
HTS	Hypertonic saline
HUS	Hemolytic uremic syndrome
ICU	Intensive care unit
IL	Interleukin
INR	International Normalized Ratio
IBD	Inflammatory bowel disorders
LMWH	Low-molecular-weight heparins
MAHA	Microangiopathic hemolytic anemia
M-CSF	Macrophage CSF
MCV	Mean corpuscular volume
MDS	Myelodysplastic syndromes
MPN	Myeloproliferative neoplasms
NESP	Novel erythropoiesis stimulating protein
NIV	Noninvasive ventilation
PCO2	Partial pressure of carbon dioxide
PE	Pulmonary embolism
PO2	Partial pressure of oxygen
PT	Prothrombin time
PvO2	Venous oxygen partial pressure
RBCs	Red blood cells
rFVIIa	Recombinant factor VIIa
rHuEPO	Recombinant human erythropoietin

SAPS II	Simplified acute physiology score
SCF	Stem cell factor
SK	Streptokinase
SvO2	Venous oxygen saturation
SM	Systemic mastocytosis
TNF	Tumor Necrosis Factor
TNF	Tumor Necrosis Factor
TRICC	Transfusion requirements in critical care
TTP	Thrombotic thrombocytopenic purpura
TKIs	Tyrosine kinase inhibitors
VO2	Oxygen consumption
WBCs	White blood cells

Introduction

Introduction

Hematologic disorders are frequently encountered in the intensive care unit, which include anemia, coagulopathy, hematological malignancies and other white blood cells abnormalities.

Anemia is a decrease in number of red blood cells (RBCs) or less than the normal quantity of hemoglobin in the blood. However, it can include decreased oxygen-binding ability of each hemoglobin molecule due to deformity or lack in numerical development as in some other types of hemoglobin deficiency *(Dressler, 2009).*

Anemia is common in the critically ill and results in a large number of RBC transfusions. Among the many causes of anemia in the critically ill patients, some of the most important are sepsis, overt or occult blood loss (including frequent blood sampling), decreased production of endogenous erythropoietin, and immuneassociated functional iron deficiency *(Price et al., 2011)* .

Also anemia of chronic disease which is a form of anemia that accounts for quarter of all anemia's in hospitalized patients; it is the predominant form of hypoproliferative anemia, and seen in patients with arthritis, chronic infections, and malignancy, which interferes with RBC production and shortens RBC lifespan *(Cullis, 2011).*

Coagulopathy is a condition in which the blood ability to clot is impaired. Blood clotting requires healthy platelet levels and approximately 20 proteins called clotting factors, or coagulation factors, reduced or missing clotting factors may be caused by a variety of

inherited or acquired disorders , such as von Willebrand's disease (hereditary bleeding disorder) , factor II deficiency, factor V deficiency, hemophilia A or B, protein C deficiency, and protein S deficiency , anticoagulant drug use, long-term use of antibiotics, severe liver disease, idiopathic thrombocytopenic purpura or thrombotic thrombocytopenic purpura, and disseminated intravascular coagulation *(Mitchell et al., 2007).*

Disseminated intravascular coagulation (DIC) can occur acutely but also on a slower, chronic basis, depending on the underlying problem. It is common in the critically ill, and may participate in the development of multiple organ failure, which may lead to death. DIC can occur in the following conditions infections, massive tissue injury as trauma and burns, cancers of lung, pancreas and stomach, as well as acute myeloid leukemia, liver disease, shock, and aortic aneurysm *(Levi et al,2009).*

Increase or decrease in the number of leukocytes in the blood, leads to different diseases and disorders of the white blood cells. Neutropenia and lymphocytopenia are caused due to low white blood cell count, while leukemia is caused due to high white blood cell count *(Parham, 2005).*

Haematological malignancies such as leukemia, lymphomas and myelomas have the greatest chance of cure amongst all malignancies. There are four common types of leukemia within the acute and chronic groups: chronic lymphocytic leukemia (CLL), chronic myeloid leukemia (CML), acute lymphocytic (lymphoblastic) leukemia (ALL) and acute myeloid leukemia (AML) *(Jaslow& Ryan, 2011).*

Aim of the work

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The aim of this work is to study the hematological disorders frequently encountered in critically ill patients in intensive care unit.