Recent Intensive Care Unit Advances in the Management of Critically Ill Cancer Patients

An Essay

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بسم الله الرحمن الرحيم

﴿ وَعَلَّمَكَ مَا لَمْ تَكُنْ تَعْلَمُ وَكَانَ
فَضْلُ اللهِ عَلَيْكَ عَظِيمًا ﴾

صدق الله العظيم
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First thanks to **ALLAH** *to whom I relate any success in achieving any work in my life.*

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Ahmed Abdelnaser Fathy

List of Contents

List of Tables

List of Figures

List of Abbreviations

Abb.	Full term
ABLC	*Amphotericin B lipid complex*
ADH	*Antidiuretic hormone*
AEDs	*Antiepileptic drugs*
AKI	*Acute kidney injury*
APL	*Acute proliferative leukemia*
aPTT	*Activated partial thromboplastin time*
ARF	*Acute respiratory failure*
ATN	*Acute tubular necrosis*
BAL	*Bronchoalveolar lavage*
BMT	*Bone marrow transplantation*
CDC	*Chronic disseminated candidosis*
CHF	*Congestive heart failure*
CIN	*Contrast-induced nephropathy*
CKD	*Chronic kidney disease*
CLL	*Chronic lymphocytic leukemia*
cP	*Centipoise*
cSCC	*Cutaneous squamous cell carcinomas*
CSW	*Cerebral salt wasting*
CT	*Computed tomography*
CTCAE	*The Common Toxicity Criteria for Adverse Events*
CTLS	*Clinical tumor lysis syndrome*
D-AmB	*Amphotricin deoxycholate*
DHTRs	*Delayed hemolytic transfusion reactions*
DIC	*Disseminated intravascular coagulation*
ECF	*Extracellular fluid*
EGFR	*Epidermal growth factor receptor*
FB-BAL	*Flexible bronchoscopy with bronchoalveolar lavage*
FFP	*Fresh frozen plasma*
G-CSF	*Granulocyte-colony stimulating factor*
GIT	*Gastrointestinal tract*
HBV	*Hepatitis B virus*
HCT	*Hematopoietic cell transplant*

List of Abbreviations cont…

Abb.	Full term
HCV	*Hepatitis C virus*
HTLV	*Human T-cell lymphotropic virus*
HVS	*Hyperviscosity syndrome*
HVS	*Hyperviscosity syndrome*
ICP	*Intracranial pressure*
ICU	*Intensive care unit*
IFDs	*Invasive fungal diseases*
ILD	*Interstitial lung disease*
IMV	*Invasive mechanical ventilation*
IPA	*Invasive pulmonary aspergillosis*
IV	*Intravenous*
L-AmB	*Liposomal amphotericin B*
LIK	*Lymphomatous Infiltration of the Kidney*
LTLS	*Laboratory tumor lysis syndrome*
LV	*Left ventricular*
MCT	*Medium-chain triglycerides*
MSCC	*Malignant spinal cord compression*
NIV	*Noninvasive mechanical ventilation*
PAH	*Pulmonary arterial hypertension*
PT	*Prothrombin time*
PTH	*Parathyroid hormone*
PTHrP	*Parathyroid hormone related protein*
QoL	*Quality of life*
SAH	*Subarachinoid hemorrhage*
SGOT	*Serum aspartate aminotransferase*
SGPT	*Serum alanine aminotransferase*
SIADH	*Syndrome of inappropriate ADH secretion*
SVC	*Superior vena cava*
TACO	*Transfusion-associated circulatory overload*
TA-GVHD	*Transfusion-associated graft-vs-host disease*
TLC	*Tumor lysis syndrome*
TLS	*Tumor lysis syndrome*

List of Abbreviations cont…

Abb.	Full term

TPN..... Total parenteral nutrition
TSH..... Thyroid-Stimulating Hormone
ULN..... Upper limit of normal

Abstract

Cancer patients with acute kidney injury present a unique set of challenges to the treatment team and their nephrology care providers. Thorough evaluation to assess for general and cancer-related etiologies can assist in forming a treatment plan that best addresses the patient's kidney and oncologic issues. It is important to consider that in certain circumstances treatment of the malignancy can lead to further kidney complications including AKI. This change in kidney function can necessitate adjustment in their oncologic care such as chemotherapy options, options for diagnostic evaluation, and other supportive care.

Until the end of previous century it remained controversial to refer or admit cancer patients to the ICU. However, over the past decade, several centers over the world have shown that is possible to achieve meaningful outcome in these patients. These relatively good results should, however, not be used to justify therapeutic perseverance or to postpone palliative care in patients who are in a desperate situation. Similarly to any other critically ill patient, the degree and duration of advanced life-supporting therapy provided should be in proportion to the patient's expected long-term survival and quality of life. Honest communication regarding these issues between the caregivers, the patient and the relatives before and upon referral to the ICU as well as during ICU stay is therefore essential.

Keywords: Parathyroid hormone related protein- Parathyroid hormone- Prothrombin time- Pulmonary arterial hypertension- Noninvasive mechanical ventilation

INTRODUCTION

A few decades have passed since intensive care unit (ICU) beds have been available for critically ill patients with cancer ***(Azoulay et al., 2011).***

Advances in the management of the underlying malignancies and support of organ dysfunctions have led to survival gains in patients with life-threatening complications from the malignancy itself, as well as infectious and toxic adverse effects related to the oncological treatments ***(Azoulay et al., 2011).***

The ageing population, improved diagnostic tools for cancer, Intensive chemotherapy regimens, and decrease in cancer-related mortality have contributed to this increase ***(Linker et al., 2002).***

The use of new and more targeted therapeutic drugs has resulted in high cancer cure rates. However, the treatment often leads to drug related organ toxicities and increased susceptibility to infection ***(Pfreundschuh et al., 2006).***

Oncologic emergencies represent a wide spectrum of disorders either from the progression of a known malignancy or presenting as the initial manifestation of undiagnosed malignancy. Patients might not show characteristic signs and symptoms, so a high degree of suspicion for malignancy-related

complications is crucial, especially in patients with known malignancy ***(Khan et al., 2014).***

Oncologic emergencies are potentially life-threatening conditions that should be recognized immediately with decisive intervention in order to minimize mortality and morbidity. The signs and symptoms of an oncologic emergency may present at any time from the time before diagnosis to the end-stage of the hematologic or oncologic malignancy ***(Judy et al., 2016).***

Acute respiratory failure (ARF) accounts for half of the reasons why oncology patients are admitted to the Intensive Care Unit (ICU) and is a leading cause of mortality. Therefore, clinicians should be aware of the most useful diagnostic and therapeutic strategies required in the "oncology patient" ***(Blot et al., 2012).***

Acute kidney injury (AKI) is a significant complication in patients with cancer and is associated with high morbidity and mortality. Rates of AKI vary in cancer patients on the basis of several factors, including type of malignancy (either solid tumor or hematologic), severity of malignancy, associated complications such as critical illness, and types of supportive or interventional therapy given to the patient ***(Christiansen et al., 2011).***

Acute kidney injury (AKI) is a frequent and significant complication of cancer and cancer therapy. Cancer patients frequently encounter risk factors for AKI including older age,

chronic kidney disease (CKD), prerenal conditions, sepsis, exposure to nephrotoxins, and obstructive physiology. AKI can also be secondary to paraneoplastic conditions, including glomerulonephritis and microangiopathic processes. This complication can have significant consequences, including effects on patients' ability to continue to receive therapy for their malignancy (***Campbell et al., 2014).***

The epidemiology of invasive fungal diseases (IFDs) in cancer patients continues to evolve while treatment of underlying malignancies with chemotherapies and new biological agents negatively impact the protective immune responses. Although IFDs are known as lifethreatening "collateral damage" that result from managing cancers, the appearance of these diseases and the outcome for patients depend on the type of cancer and its treatment. Furthermore, from a diagnostic and preventive standpoint, it is essential that clinicians assess both the general risks of IFDs in a particular patient and the specific local risks within the context of hospital practices, patient populations, and local infection control effectiveness ***(John et al., 2014).***

Malnutrition is a common problem in cancer patients that adversely affects quality of life and survival. It results from a multifactorial process involving host and tumor interactions. These interactions alter nutritional intake and cause massive metabolic disturbances. Many of these metabolic aberrations are wasteful and energy-consuming in an already energy-

deprived host ***(David et al., 1998),*** So, Total parenteral nutrition (TPN) is a life-saving method of nutritional support for patients who are unable to ingest, digest or absorb sufficient nutrients to prevent death from starvation that intravenous feeding could provide the sole means of nutritional support, promote growth in a child, and restore weight loss in an adult ***(Murray, 2014).***