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Nutritional Support in Polytrauma Patients with Organ Dysfunction

An Essay

Submitted for Partial Fulfillment of Master Degree in General Intensive Care

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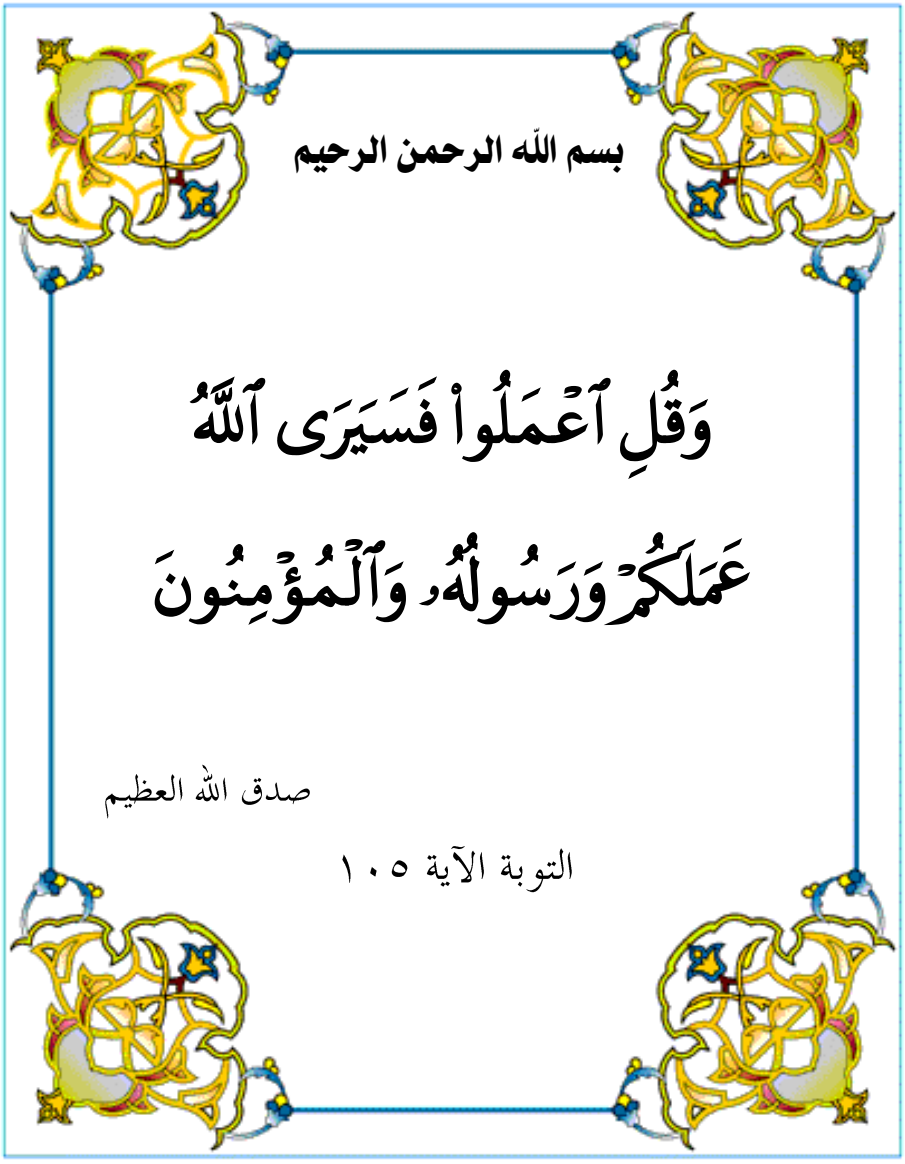
بسم الله الرحمن الرحيم
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Contents

List of Abbreviations

Abb.	Full term
ACTH	Adreno corticotrophic hormone
ADP	Adenosine diphosphate
AKI	Acute kidney injury
ALI	Acute lung injury
AMP	Adenosine monophosphate
AMPA	Amino-3-hydroxy-5-methyl-4-isoxazole propionic acid
APACHE	Acute physiology and chronic health evaluation
APC	Antigen presenting cell
ARDS	Acute respiratory distress syndrome
ARF	Acute renal failure
ASPEN	American society of parentral and enteral nutrition
ATI	Abdominal trauma index
ATLS	Advanced trauma life support
ATP	Adenosine triphosphate
BCAAs	Branched chain fatty acids
BEE	Basal energy expenditure
BMI	Body mass index
BMR	Basal metabolic rate
C *difficile*	Clostridium difficile
Ca^{2+}	Calcium
CARS	Compensatory antinflammotory response syndrome
CIs	Cardiac indices
cm.	Centi meter
COPD	Chronic obstructive pulmonary disease
CPGs	Clinical practice guidelines
CRRT	Continuous renal replacement therapy
Cu	Copper
CVVH	Continuous veno-venous hemo-filteration
CVVHD-F	Continuous veno-venous hemo-diafilteration
d	Day
DHA	Docosahexaenoic acid
DM	Diabetes Mellitus
DNA	Deoxyribonucleic acid

Abb.	Full term
DO_2	Oxygen delivery
DPEJ	Direct percutenous endoscopy jejunostomy
e.g.	Exempli gratia
ebb phase	Early postinjury phase
EEE	Estimated energy expenditure
EN	Enteral nutrition
EPA	Eicosapentaenoic acid
ESPEN	European society of enteral and parentral nutrition
FDA	Food and drug administration
Fe	Iron
g	Gram
GALT	Gut-associated lymphoid tissue
GIT	Gastrointestinal tract
GRVs	Gastric residual volumes
G-SH	Glutathione
H^+	Hydrogen
H_2O_2	Hydrogen peroxide
HD	Hemodialysis
Ht.	Height
i,e.	Id est
IBW	Ideal body weight
IC	Indirect calorimetry
ICAM-1	Intracellular adhesion molecule-1
ICU	Intensive care unit
IEN	Immune enhancing nutrition
IgA	Immuno-globulin A
IL-1	Interleukin -1
IL-6	Interleukin -6
I.M.	Intramascular
ISS	Injury severity score
I.V.	Intravenous
K^+	Potassium
Kcal	Kilo calory
kD	Kilo Dalton
Kg.	Kilo gram
L	Liter
LBM	Lean body mass

Abb.	Full term
LCT	Long chain triglycerides
MALT	Mucosa-associated lymphoid tissue
MCP-1	Monocyte chemoattractant protein-1
mEq/d	Milli equivalent / day
mEq/L	Milli equivalent / liter
Mg^{2+}	Magnesium
mg	Milli gram
mg/dl	Milli gram / deciliter
ml	Milli liter
mmol/L	Milli mole / liter
mmol/kg	Milli mole / kilogram
Mn	Manganese
MODS	Multi organ dysfunction syndrome
MOF	Multi organ failure
mosmol/L	Milli osmole / liter
MUFA	Mono unsaturated fatty acid
MUST	Malnutrition universal screening tool
MV	Minute ventilation
N_2	Nitrogen molecule
n-3 PUFA	N-3 poly unsaturated fatty acid
Na^+	Sodium
NFKB	Nuclear factor –kappa B
NICE	National institute for health and clinical excellence
NMDA	N-methyl-D-aspartate
NO	Nitric oxide
NRS	Nutritional risk screening
O_2	Oxygen molecule
O_2^-	Super oxide anions
OH^-	Hydoxyl ions
ONS	Oral nutritional supplements
PEG	Percutenous endoscopic gastrostomy
PEG/J	Percutenous endoscopic gastrostomy with a jejunal tube
PEW	Protein energy wasting
PICC	Peripherally inserted centeral catheters
PN	Parentral nutrition
PPAR	Peroxime proliferator-activated receptor

Abb.	Full term
RDA	Recommended dietary allowance
REE	Resting energy expenditure
RFS	Refeeding syndrome
RNA	Ribonucleic acid
RRT	Renal replacement therapy
SCCM	Society of critical care medicine
Se	Selenium
SGA	Subjective global assessment
SICAM-1	Soluble intercellular adhesion molecule-1
SIRS	Systemic inflammatory response syndrome
SNAQ	Short nutritional assessment questionnaire
SOD	Super oxide dismutase
SOFA	Sequential organ failure assessment
T	Time
TBI	Traumatic brain injury
tds	Three times daily
TEE	Total energy expenditure
TNF	Tumor necrosis factor
TPN	Total parenteral nutrition
UUN	Urine urea nitrogen
VAP	Ventilator aquired pneumonia
VCO_2	Carbon dioxide exchange
VO_2	Oxygen consumption
Wt.	Weight
Zn	Zinc

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Nutritional Support in Polytrauma Patients with Organ Dysfunction

Abstract

A significant number of deaths in polytrauma occurs days to weeks after the primary insult, caused by infection and organ failure and their resultant hypercatabolic state, causing acute protein malnutrition. Nutrition therapy should be planned and integrated with other measures of management for patients with polytrauma and major burns. The goals of nutrition therapy in these patients include early delivery of nutritional components (energy, protein, fluid and micronutrients), by enteral, parenteral or both routes, to prevent protein energy wasting (PEW), preserve lean body mass (LBM), to promote wound healing. However, resuscitation efforts should precede nutritional support. Critically ill polytrauma patients with their proinflammatory states and increased oxygen free radicals production will benefit from immunonutrion. Immunonutrients include glutamine, arginie, ω-3 fatty acids, Selenium and some vitamins. They are substrates which modulate inflammatory process in order to decrease critical illness severity and avoid complications.

Key words: Polytrauma, critically ill patients, systemic inflammatory response syndrome (SIRS), multiorgan failure (MOF), enteral nutrition (EN), parentral nutrition (PN), immunonutrition, protein energy wasting (PEW).

Introduction

A significant number of deaths in polytrauma occurs days to weeks after the primary insult, caused by infection and organ failure and their resultant hypercatabolic state, causing acute protein malnutrition. Nutrition therapy should be planned and integrated with other measures of management for patients with polytrauma and major burns. After the initial measures dictated by advanced trauma life support (ATLS), including the airway (A), breathing (B), circulation (C), disability (D) and exposure (E), the letter (F) for feed should be included to reflect the significance of early nutrition support in trauma. There is proportionate relation between nutritional status and the outcome of surgical intervention. Nutritional deficits are associated with increased risk of morbidity and mortality **(Bicudo-Salomao et al, 2013).**

The catabolic state in polytrauma patients must be early recognized and properly managed by appropriate nutritional support. So, there is a great significance of nutrition in these critically ill intensive care unit (ICU) patients **(Hasenboehler et al, 2006).**

Over the past few decades, the studying of the molecular and biological influences of nutrients in

maintaining homeostasis in the critically ill patients has made great achievements. Conventionally, nutritional support in critically ill patients was considered adjunctive measure designed to deliver exogenous fuels to meet the patient's demands during the periods of stress response **(McClave et al, 2009).**

Nutrition therapy enriched with immunomodulatory substrates aim to improve the hyperinflammatory phase, called systemic inflammatory response syndrome (SIRS) to avoid sepsis and multiorgan failure (MOF) **(Bastian and Weimann, 2002).**

The choice of nutritional care plan should to be altered according to the organ dysfunction to avoid complications as in cases of head injuries, respiratory failure, renal impairment or hepatic impairment **(MaClave et al, 2009).**

Aim of the Essay

The aim of essay was to highlight and discuss the nutritional derangement in polytrauma patients and to identify the suitable nutritional support for such polytrauma patients associated with organ dysfunction.