Practical challenges in Nutritional Support of Pre & Post Liver Transplant

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Prevalence of Malnutrition

- 20% Compensated liver disease
- >80% Decompensated liver disease
- 100% Await Liver Transplant

Antonio J. Sanchez; Mayo Clinic Foundation, 2006





Algorithm content developed by John Anderson, PhD, and Sanford C. Garner, PhD, 2000. Updated by Jeanette M. Hasse and Laura E. Matarese, 2002.



Abnormalities of metabolism

Poor nutrient intake

MALNUTRITION

Morbidity Mortality



Malnutrition in CLD - Cause, Etiology

Causes	Etiology						
<section-header></section-header>	Decreased Intake and anorexia	 Unpalatable Diets Na & H₂O restriction) Disgeusia due to micronutrient deficiencies (Zn or Mg) Anorexia effect caused by increased levels of proinflammatory cytokines and leptin 					



Malnutrition in CLD – Cause, Etiology

Causes	Etiology					
Reduced nutrient intake	 Nausea & early satiety 	 Tense Ascites Gastroparesis Small bowel dismotility Bacterial over growth 				
	 Starvation 	 Hospitalization Invasive diagnostic procedure requiring fasting Gastrointestinal bleeding and endoscopic therapies 				
Reduced Intestinal absorption	MaldigestionBacterial over growthDiarrhea	 Pancreatic insufficiency in Alcohol abuse and /or Cholestasis) Drugs (i.e., nonabsorbable disaccharides, antibiotics and cholestyramine) 				



Malnutrition in CLD – Cause, Etiology

Causes	Etiology					
Altered Metabolism/ Expenditure	 Protein Catabolism 	 Reduced hepatic protein synthesis and increased protein breakdown 				
	 Increased energy expenditure 	 During ascites and bacterial infections Hepatocellular carcinoma 				
	 Insulin resistance Increase fat turnover 	 Hyperinsulinemia and reduced nonoxidative glucose metabolism Increased lipolysis due to more rapid transition to starvation Fats are utilized as alternative energy source 				





Altered metabolism

Protein	 Imbalance in BCAA and aromatic amino acids ✓ Expected Ratio – 3.5:1 ✓ Decreased to 1:1 increased cerebral uptake of aromatic amino acids promoting the synthesis of false neurotransmitters •Muscle wasting
Fat	 Nocturnal fat metabolism - impaired synthesis
(preferred	PUFA from EFA Decreased PUFA associated with severity of
fuel)	malnutrition



Malnutrition in CLD - Pathophysiology

PATHOPHYSIOLOGY

NUTRITION ASSESSMENT

Serial monitoring of body weight and anthropometry

Dietary intake

Subjective global assessment

POSSIBLE CLINICAL FINDINGS Abnormal liver function tests Jaundice Ascites and edema Hepatic encephalopathy Portal hypertension and varices Altered amino acid levels Vitamin/mineral deficits Glucose intolerance or fasting hypoglycemia

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Nutrition Assessment

Subjective Global Assessment (SGA)





AH-QF-DT-44

Patients Label

HOSPITALS

SUBJECTIVE GLOBAL ASSESSMENT (ADULTS)

(A) Patient's related medical history 1. Weight change (overall change in past 6 months) 1. Weight change (overall change in past 6 months) 1. Weight change (overall change in past 6 months) 1. Weight change (overall change in past 6 months) 1. Weight change (overall change in past 6 months) 1. Weight change (overall change in past 6 months) 1. Weight change (overall change in past 6 months) 1. Weight change (overall change in past 6 months) 1. Weight change (overall change in past 6 months) 1. Weight change (overall change in past 6 months) 1. Weight change (overall change in past 6 months) 1. Weight change (overall change in past 6 months) 1. Weight change (overall change in past 6 months) 1. Weight change (overall change in past 6 months) 1. Weight change (overall change in past 6 months) 1. Weight change (overall change in past 6 months) 1. Weight change (overall change in past 6 months) 1. Weight change (overall change in past 6 months) 1. Weight change (over an orderable) 1. Weight (over an orderable) 1. Weight (over an orderable) 1						
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2. Defary intake (Duration)	gain	<5%	5-10%	10-15%	Weight 1033 > 10 /0	
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Guidelines for estimating fluid weight (kg)

Category	Ascites	Odema
Minimal	2.2	1.0
Moderate	6.0	5.0
Severe	14.0	10.0

- Grade 1 (mild). Ascites is only detectable by ultrasound examination.
- Grade 2 (moderate). Ascites causing moderate symmetrical distension of the abdomen
- Grade 3 (large). Ascites causing marked abdominal distension.



Fluid retention in ESLD & relevance to nutrition

Impairs food intake

 Energy expenditure increases

Negative nitrogen balance



Factors influencing the accuracy of common indices used for nutritional assessment

Body weight	 Water restriction and fluid accumulation Changes in body composition
Visceral proteins	Decreased liver synthesisIncreased volume of distribution
Anthropometry	 Fluid retention
Immunological status	HypersplenismAbnormal immunological reactivity
Creatinine excretion	 Renal insufficiency
Bioelectrical impedance analysis	 Presence of ascites



Nutritional Goals

- Correct malnutrition
- Prevent metabolic complications
- Improve quality of life
- Reduce Perioperative complications
- Nutrition education Individual care plan



Nutritional Management - CLD

 Energy: 35 to 40 kcal/kg dry weight BEE x 1.2 to 1.3, depending on degree of malnutrition

CHO: 60 – 70 % of cals as complex & simple CHO

- Protein: 1.2 to 1.5 g/kg dry wt depending on degree of malnutrition, malabsorption, metabolic stress
 - To maintain
 - Muscle mass
 - Protein levels in the blood

ESPEN Guidelines on Enteral Nutrition: Liver disease 2006



Nutritional Management - CLD

- Hepatic Encephalopathy
 - BCAA formula
- Fat: 25% to 40% of kcal
- Electrolytes: restrict sodium with edema or ascites (2 - 4 g/day)
- Fluid: restrict fluid if hyponatremia is present
- Individualized



Practical Difficulties in meeting Nutrition Prescription

Study Design

Study Duration Setting

Study Population Data Collected

- : Single Center, Prospective study
- : May to August 2013
- : Liver ICU, Tertiary care hospital, Chennai

: ESLD

- : Baseline demographics Nutritional status
 - Subjective Global Assessment (SGA)
 - Nutrition Data



Baseline Demographics

	Mean ± Std	Range
Age (yrs)	45.4±9.32	30 - 58
Height (cms)	168.5±10.6	157 - 180
Weight (kg)	75.3±17.01	36 - 94
BMI (kg/m²)	26.45±5.08	14.61 - 32.86
MAC (cms)	26.08±4.25	18 - 32
MELD	19.6±4.46	11 - 23



Baseline Nutritional Status





Classification - Child Pugh Score





% Nutritional Target Achieved



How did we achieve Nutrition Goals?

- Nutrition Monitoring
 - Oral intake was monitored using a food and fluid chart by the Nurses
 - Calorie Count done by the Dietitian
 - Labs : Hb, Serum Albumin, Lymphocytes, Na, K etc.,



Nutrition Monitoring – Oral diet

Name:								AH-QF-DT-48					
UHID No: .								APOLLO HOSP	TAL	_S			I
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Diet Presc	ribed:						FO	OD & FLUID	C	НА	R	Г	I
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FOOD 8	& DRINK ITEMS	NIL	1/4	1/2	3/4	ALL	FOOD 8	DRINK ITEMS	NIL	1/4	1/2	3/4	ALL
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Breakfast							Breakfast						
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Mid-							Mid-						
Morning							Morning						
Lunch							Lunch						
Lunch							Lunch						
Tea Time							Tea Time						
Tea Time							Tea Thire						
Dinner							Dinner						
Bed Time							Bed Time						

Total Calorie Intake(approx): Protein Intake(approx): Remarks (If any):

Signature of the Nurse:

Signature of the Dietitian:

Total Calorie Intake(approx): Protein Intake(approx): Remarks (If any):

Signature of the Nurse:

Signature of the Dietitian:



How did we achieve Nutrition Goals?

Nutrition Education

- Educated on the salt and fluid restrictions
- Emphasized on
 - Increased caloric and protein intake
 - Oral Nutrition Supplement (ONS)
 - Nocturnal tube feed suggested if oral intake is not adequate



Reasons for Deviation

- Salt & fluid restriction
- Fever, Infection & Abdominal Pain
- Hepatic encephalopathy
- Nausea
- Procedures



General recommendations

- Small frequent meals
- Monitor calorie count
- TPN GI dysfunction is present
- Aggressive nutrition support
 - Highly Individualized
 - Minimize catabolism
 - Slow the deterioration of nutritional status



Post -operative state



Immediate Post - operative state

Nutrition Status is affected by

- Graft function
- Pre existing malnutrition
- The stress response to surgery
- Catabolic effects of high dose steroids



Nutrition Care Plan

Post OP Nutrient recommendations

Energy – 1.2 – 1.3 times BEE

- BEE using Harris Benedict equation
- AEE : 1.3×BEE

Protein - 1.3 - 2g / kg / day

American Association for the Study of Liver Disease



Effect of Nutrition Support in the post liver transplant Indian Adult Patients

Study design : Single centre, Prospective

: 27 subjects

- Study period : Jan Sep'13
- Sampling technique: Random
- Sample size
- Setting
- Inclusion criteria
- Exclusion criteria

- : Liver unit, Tertiary care hospital
- : All Indian adults who underwent transplant for the first time
- : All paediatric and international pts

On admission, the demographic, biochemical, nutritional, and anthropometric details were noted



Baseline Characteristics

Characteristics of Patients	Mean±Std	Range
Age(yrs)	47.5±9.59	25-60
Height(cms)	163.6 ± 10.05	143-182
Weight(Kg)	69.5±13.56	36-95.5
BMI(Kg/m ²)	26.01±5.14	14.79-38.94
MAC(cms)	25.8±4.13	18-35
MELD	18.1±3.78	11 - 23
A/G Ratio	0.9±0.36	0.3 - 1.8



Objectives

- To study the effect of
 - disease severity on nutritional status and outcomes
 - nutritional intervention in A/G ratio, LOS in ICU and hospital and nutritional status of the patients
 - ethanol and non-ethanol related ESLD and type of transplant (DDLT and LDLT) in nutritional status and outcome





Type of Diagnosis





Baseline Nutritional Status





Classification - Child Pugh Score





% Calorie Achieved



% Protein Achieved





Results

- Strong correlation between the disease severity score (child) and the nutritional status (SGA) of the patients
- There was an improvement in weight and A/G ratio of the patients after nutritional intervention and was significant (p<0.001)
- Length of stay in ICU and Hospital were 9.9+/6.9 and 16.07+/10.78 respectively
- LOS of child C class in the hospital (17.5 days) was comparatively higher than the child - B class (13.1 days)
- There is a strong correlation between the ethanol intake and the nutritional status (SGA) of the patients (p< 0.014)

Conclusion

 A protocolized nutritional support and close monitoring reduced the risk of adverse outcomes in our study population



How did we achieve Nutrition Goals?

Nutrition Monitoring

- Oral intake was monitored using a food and fluid chart by the Nurses
- Calorie Count done by the Dietitian
- Labs : Hb, Serum Albumin, Lymphocytes, Na, K etc.,
- Protocolized treatment plan



How did we achieve Nutrition Goals?

Nutrition Education

- Post transplant diet education
- Emphasized on
 - Increased caloric and protein intake
 - Oral Nutrition Supplement (ONS)
 - Food hygiene and safety



Reasons for Deviation

- Surgical stress
- Fever, Infection & Abdominal Pain
- Nausea & Vomiting
- Procedures



THANK YOU

