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Case Report

Nutrition profile of a liver transplant recipient

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ABSTRACT

Malnutrition is almost universally present in patients undergoing liver transplantation. In this report, a male adult patient was followed from his pre-liver transplant phase until chronic post-transplant phase (3 months after the transplant). Improvement in nutrition status, quality of life, and performance status was seen from the pre-transplant to chronic post-transplant phase. Day to day nutrition monitoring and gradual increase in calorie and protein intake was seen in the acute post-transplant phase, but during pre- and chronic post-transplant phase, lack of nutrition support was observed in the patient.

Key words: Liver transplant; malnutrition; nutrition profile

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INTRODUCTION

Liver transplantation (LT) is the only treatment for the end-stage liver disease (ESLD).[1] It is estimated that malnutrition occurs in 65-100% of patients with ESLD.[2,3] Medical nutrition therapy provided by a registered dietician is necessary during all phases of LT for improved surgical outcomes.[4]

CASE REPORT

Nutrition therapy for LT is divided into three phases: (1) pre-transplant - provision of adequate nutrients without aggravating ESLD symptoms; (2) acute post-transplant - high protein feeds through various routes to achieve adequate intakes; and (3) chronic post-transplant - aggressive nutrition therapy for improved survival.[4]

Pre-transplant phase

A 54-year-old Indian male patient diagnosed with ethanol and hepatitis C virus-related chronic liver disease underwent living donor LT (Child-Turcotte-Pugh score[5] = 8, Model for ESLD score[6] = 14). Medical history showed the patient suffered from jaundice (for 2 years), ascites (for 3 months) and excessive fatigue (for 15 days). The patient was admitted 12 days before LT. Biochemical parameters before LT depicted deranged results [Table 1].

Nutrition status assessment by anthropometry depicted mild malnutrition by mid-arm muscle circumference (MAMC) and severe malnutrition by triceps measurement.[7] Subjective global assessment (SGA) showed moderate malnutrition.[8] Hand grip strength (both hands) showed severe malnutrition.[9]

Body composition analysis depicted standard physique of the patient with normal levels of fat percentage, fat-free mass (FFM), and muscle mass [Table 2].[10]

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Diet history depicted no gastrointestinal (GI) symptoms, dental or oral problem, or food allergies. The simplified nutritional appetite questionnaire (SNAQ) score was 16 hence there was no significant risk of at least 5% weight loss within 6 months.[11] The patient was alcoholic (CAGE score > 2).[12] He was recommended an oral normal diet with supplements providing 2700 kcal, 115 g of proteins with salt (2 g) and fluid restriction (1.5 L/day).[4] Patients' intake was 1100 kcal and 40 g protein, indicating consumption of 57.6% of the recommended calories.

Table 1: Biochemical parameters of the patient before the transplant

Biochemical parameter	Value	Range	Biochemical parameter	Value	Range
Hb (mg/dL)	8.5	13-17	Na (mmol/L)	134	137-145
WBC (10^3/UL)	8.31	4.00-10.00	K (mmol/L)	3.7	3.5-5.1
Platelets (10^3/UL)	100	150-410	Ca (mg/dL)	8.9	8.4-10.2
Alb (g/L)	3	3.5-5.0	Mg (mg/dL)	1.5	1.6-2.3
Bili (D) (mg/dL)	0.1	0.2-1.3	P (mg/dL)	4.3	2.5-4.5
Bili (T) (mg/dL)	1.5	0.2-1.3	Cl (mmol/L)	106	98-107
Total protein (g/L)	6.4	6.3-8.2	PT	15.6	8.8-12.3
ALT/SGPT (U/L)	23	21-72	INR	1.51	
AST/SGOT (U/L)	34	17-51	CR protein (mg/dL)	11.6	0.0-10.0
γ glutamyl transferase (U/L)	28	15-73			
Alkaline phosphates (U/L)	63	30-120			
Urea (mg/dL)	61	10-50			
Cr (mg/dL)	1.6	0.80-1.50			

Hb: hemoglobin; WBC: white blood cell; Alb: albumin; Bili: bilirubin; ALT: alanine aminotransferase; AST: aspartate aminotransferase; Cr: creatinine; PT: prothrombin time; INR: international normalized ratio; CR protein: C-reactive protein; SGPT: serum glutamic pyruvic transaminase; SGOT: serum glutamic oxaloacetic transaminase

Table 2: Nutrition assessment of the patient

Parameter	Observation	Evaluation
Anthropometric evaluation		
Weight (kg)	73.9	
Height (cm)	176	
Ideal body weight (kg)	76	
Triceps[7] (cm)	0.56	Severe malnutrition
MAMC[7] (cm)	22	Mild malnutrition
SGA[8]		
SGA[8]	6	Moderate malnutrition
Body composition analysis by bioelectrical impedance analysis[9]		
Weight (kg)	72.55	Normal
Fat (%)	22.5	Normal
Fat mass	16.3	Normal
FFM (kg)	56.25	Normal
Muscle mass (kg)	53.35	Normal
BMI	23.2	Normal

MAMC: mid-arm muscle circumference; SGA: subjective global assessment; FFM: fat-free mass; BMI: body mass index

Eastern Cooperative Oncology Group (ECOG) performance status score of 3 indicated that the patient was capable of only limited self-care and unable to carry out any work activities that was ≥ 50% of working hours.[13] Quality of life (QOL) assessment by short form-36 before LT depicted low level in its eight dimensions [Figure 1].[14]

Acute post-transplant phase

The altered blood parameters are important for implementing the nutrition therapy plan. Deranged biochemical parameters in this phase are presented in Figure 2a-h. The patient had been in intensive care unit for 3 days. At post-operation day (POD), 1 patient was extubated within 24 h and was provided propofol 45 mL (1 kcal/mL) and dextrose normal saline 440 mL (17 kcal/100 mL), KCl 45 mL intravenously. On POD 2 propofol, 120 mL and KCl 120 mL was given. On POD 3 KCl 40 mL along with oral liquids (250 kcal) was given. On POD 4, he was transferred to the LT unit and was given oral high protein normal diet with supplements providing 2,700 kcal and 115 g protein. The patient was not able to complete meals (especially lunch and dinner), because of nausea and lack of appetite. An increasing trend of energy and protein consumption after LT during the hospital stay is indicated in Figure 3. The patient met 76.4% and 103% of the recommended calorie and protein intake, respectively. The patient was discharged on POD 15, on 2,700 kcal and 115 g of proteins (high protein, low potassium normal diet) out of which 375 kcal and 36 g of protein were from low potassium nutrition supplements and about 352 kcal, and 24 g protein was from high calorie-protein biscuits.[4] He was recommended to take multivitamins and potassium binding medications, to monitor glucose regularly, and to avoid the outer

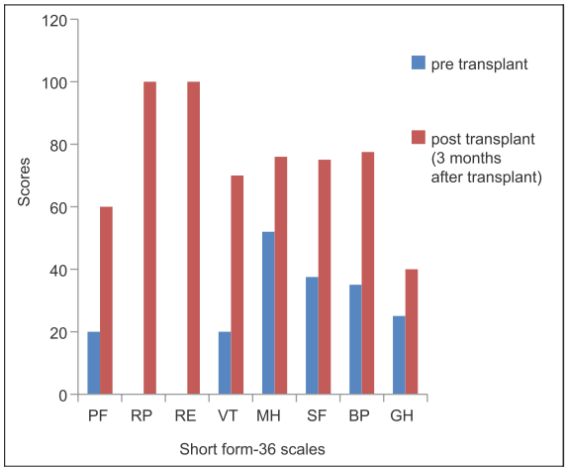

Figure 1: Comparison of quality of life by short form-36 questionnaire pre- and post-transplant. PF: physical functioning; RP: role limitation due to physical health; RE: role limitation due to emotional problem; VT: vitality; MH: mental health; SF: social function; BP: body pain; GH: general health

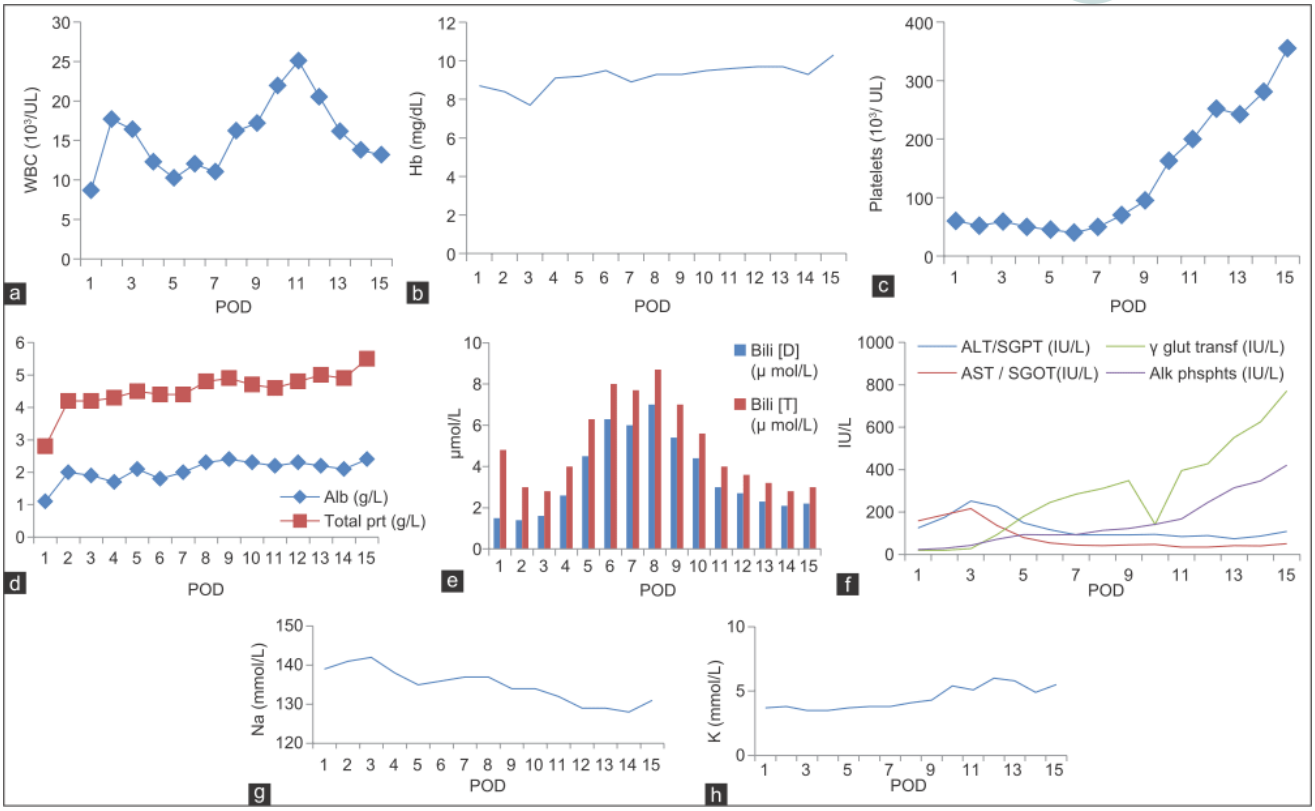

Figure 2: Each panel depicts acute post-operative patient profile of WBC (a), hemoglobin (b), platelets (c), albumin and total protein (d), bilirubin (D and T) (e), AST, ALT, γ glutamyl transpeptidase and alkaline phosphates (f), sodium (g), and potassium (h), respectively. Hb: hemoglobin; WBC: white blood cell; Alb: albumin; Bili: bilirubin; AST: aspartate aminotransferase; ALT: alanine aminotransferase; POD: post-operation day

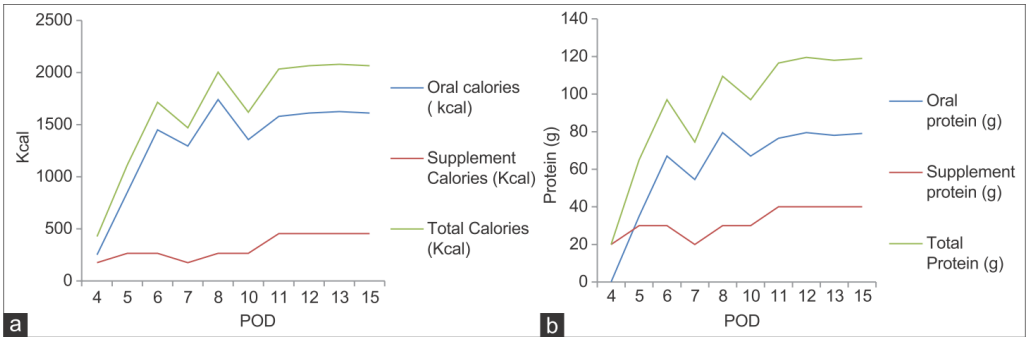

Figure 3: Energy (a) and protein (b) intake of the patient during the hospital stay after the transplant. POD: post-operation day

source of infection.

Chronic post-transplant phase

Gradual improvement in all the biochemical parameters was seen after 3 months of LT [Table 3]. The patient regularly visited the hepatologist after the surgery but never visited the dietician. The patient's intake was 1983 kcal and 78.9 g protein from the oral diet without any nutritional supplement. The recommended intake amounts to 2,280 kcal and 76 g of protein.[4] Hence, patient met 83.9% of calorie requirements.

The patient was not having any GI problem; he was able to perform daily routine functions. The SNAQ score was 16 which showed no significant risk of at least 5% weight loss within 6 months.[11] QOL assessment depicted improvement of all the eight dimensions 3 months after LT [Figure 1].[14] The performance status assessment by ECOG improved from a score of 3 to 1 which indicated that the patient was restricted in physically strenuous activity but was ambulatory and able to carry out work of a light or sedentary nature.[13] Nutrition status assessment is depicted in Table 4. Anthropometric examination through, MAMC[7] showed similar results as in pre-transplant phase, which is mild malnutrition. Triceps measurement improved from severe malnutrition to normal range.[7] SGA scores improved from moderate malnutrition to normal.[8] Body composition analysis depicted higher levels of fat percentage and FFM after 3 months of LT.[10] Hand grip

Table 3: Patients' biochemical profile after discharge

Days after discharge	Hb (mg/dL)	WBC (10^3/UL)	Platelets (10^3/UL)	Bil (T) (mg/dL)	Bil (D) (mg/dL)	AST (IU/L)	ALT (IU/L)	Alkaline phosphates	γ glutamyl transferase (IU/L)	Alb (g/dL)	Na (mmol/L)	K (mmol/L)	Cr (mg)
1	9.5	12.02	40	8	6.3	54	117	92	245	1.8	136	3.8	0.8
2	8.9	11.02	50	7.7	6	44	92	94	284	2	137	3.8	
3	9.3	16.2	70	8.7	7	41	92	113	311	2.3	137	4.1	0.8
4	9.3	17.18	95	7	5.4	45	92	122	348	2.4	134	4.3	0.8
5	9.5	21.93	163	5.6	4.4	47	95		362	2.4	134	5.4	0.8
6	9.6	25.6	200	4	3	34	84	167	396	2.2	132	5.1	0.9
7	9.7	20.51	252	3.6	2.7	35	89	245	428	2.3	129	6	1
8	9.6	16.13	242	3.2	2.3	41	74	314	552	2.2	129	5.8	1
9	9.2	8.09	185	1.5	0.9	30	117	82	195	1.9	131	4.6	0.8
10	10.3	10.17	355	3	2.2	51	109	421	772	2.4	131	5.5	0.9
12	9	13.14	305	2.1	1.6	52	78	287	733	2.2	133	4.1	1
15	9	13.19	300	2.3	2	105	196	294	737	2.3	137	3.3	0.9
19	9.8	17.86	373	2	1.7	67	221	325	828	2.6	138	3.7	0.9
26	11.20	15.48	301	1.0	0.8	57	119	213	623	2.50			1.0
33	11.30	17.37	312	0.7	0.7	42	86	178	474	2.50		4.0	0.8
34	11.70	13.27	311	0.7	0.5	39	83	162	449	2.60			
41	12.40	14.80	326	0.6		44	91	169	382	2.90	135	5.3	0.9
53	11.30	13.05	328	0.3	0.2	38	69						
54	12.20	13.22	308	0.5	0.4	55	102	160	283	2.70			
72	10.90	22.63		0.6	0.2	29	42	220		4.90	146	4.2	1.3
88				0.4	0.3	23	32	116	107	3.10	140	4.8	

Hb: haemoglobin; WBC: white blood cell; Alb: albumin; Bili: bilirubin; AST: aspartate aminotransferase; ALT: alanine aminotransferase; Cr: creatinine

Table 4: Comparison of nutritional status in pre-transplant and chronic post-transplant phase (3 months after LT)

	Pre-transplant	Post-transplant (3 months after transplant)
Anthropometric evaluation		
Weight (kg)	73.9	78.6
Height (cm)	176	176
Triceps[7] (cm)	0.56	1.5
MAMC[7] (cm)	22	21.2
SGA[8]		
SGA[8] (score)	6	2
Body composition analysis by bioelectrical impedance analysis[9]		
Weight (kg)	72.55	76.6
Fat (%)	22.5	28
Fat mass (kg)	16.3	21.45
FFM (kg)	56.25	55.15
Muscle mass (kg)	53.35	52.3
TBW (%)	53.5	47.6
BMI	23.2	24.5
Bone mass (kg)	2.90	2.85

MAMC: mid-arm muscle circumference; SGA: subjective global assessment; FFM: fat-free mass; TBW: total body water; BMI: body mass index; LT: liver transplantation

strength (both hands) showed severe malnutrition similar to pre-transplant phase.[9]

DISCUSSION

A high incidence of malnutrition has been seen in LT recipients.[5,14,15] Accurate estimation of the nutritional status of patients with ESLD presents a major challenge due to fluid retention found in patients and the effect of liver function on protein synthesis.[16] Malnutrition has also been associated with poor surgery outcome and increased morbidity and mortality. In India, LT is a relatively new area, and there is a lack of data about the general and nutritional profile of patients undergoing LT. It is essential to identify and correct nutritional deficiencies in LT recipients. Hence, this case report provides information on the day to day nutrition profile and the medical nutrition therapy of a LT recipient with the aim of improving outcomes.

A gradual improvement in the nutrition, biochemical, and functional parameters was seen after 3 months of transplant. Nutrition assessment by SGA, triceps, and body composition analysis showed better nutrition status 3 months after LT. During the acute post-transplant phase, continuous observation by medical and nutrition experts helped to fulfill nutritional needs through various feeding routes. However, the difference in calorie and protein intake in chronic post-transplant phase is due to lack of counseling from nutrition experts. Hence, proper nutrition monitoring is required during all phases of transplant to maintain the overall health of the patient.

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Conflicts of interest
There are no conflicts of interest.

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