Nutritional risk in allogeneic stem cell transplantation: Rationale for a tailored nutritional pathway

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Rationale

Hematopoietic stem cell transplantation carries nutritional related risks; therefore, nutritional therapies needs to be immediately initiated after starting treatment. We hypothesized that the nutritional risk of allogeneic Blood stem cell Transplantation could be affected by nutrition adverse events, and we evaluated the usefulness of nutritional pathways involving nutritional intervention in comparison with those involving other *post hoc* nutritional intervention.

Objectives

We assess nutritional risk among patients who undergo allogeneic stem cell transplantation.

Methods

【Study design】 A retrospective study. *Post-hoc* power analysis. 【Study period】 April. 2007 to Dec. 2012 【Sample size】 51 patients (Shizuoka Cancer Center, Japan)
【Evaluation period】 The pretreatment of pretreatment for transplantation to after the end of Parenteral Nutrition (PN).

Nutritional assessment point : T1 point to T2 point.

★ Nutritional assessment item.

○ BMI : T1 ○ Loss of Body Weight (LBW and %) : T1→T2

○ BIA ; In Body S20 ®(Biospace) : T1→T2

2 h after the patient’s breakfast.

Extracellular fluid ; ECF/ total body fluid ;TBF : 0.38 ↓

Extracellular water ;ECW/ total body water TBW : 0.40 ↓

○ Relationship between: T1→T2

Nutrient supply (calorie ,protein / IBW) and weight ,BIA (SMM, FM).

“%LBW ≥7.5” group vs “%LBW <7.5” group (Cut off %7.5LBW : 3 month ; Jane V.JPEN,2012.)

○ BMI, IBW%, LBW%, BIA, Nutrient supply (calorie ,protein / IBW) , Start day of oral intake, and engraftment day graft versus host disease; GVHD

○ Relationship between: T1→T2 CTCAE and orally ingested calories

In Body S20 body (Biospace, Korea) 6 frequency impedance values in descending order at 8 locations.

Results

Table 1. Nutritional assessment

		P value*
Preoperative BMI (min-max)	22.1 kg/m ² (16.5-31.5)	
Assessment period (min-max)	54 days (29-98)	
%LBW (min-max)	-4.5% (4.9- -18.8)	
Significant %LBW cases (n)	13/51	
Preoperative body weight (min-max)	62.6 kg (40.3-92.3)	
Weight variations during assessment period (min-max)	-2.5 kg (2.5- -14.1)	< 0.0001
Preoperative skeletal muscle mass (min-max)	25.3 kg (13.5-34.5)	
Skeletal muscle mass variations during the assessment period (min-max)	-1.2 kg (1.8- -7.4)	< 0.0001
Preoperative body fat mass (min-max)	16.2 kg (3.7-33.9)	
Body fat mass variations during the assessment period (min-max)	-0.7 kg (-1.5- -3.0)	0.0004
Phase angle variations during the assessment period	-0.66° (0.7- -3.65)	< 0.0001
Pretreatment BIA (min-max): ECF/TBF, ECW/TBW (min-max)	0.35 (0.31-0.37), 0.39 (0.36-0.42)	
Post-PN off BIA (min-max): ECF/TBF, ECW/TBW (min-max)	0.35 (0.33-0.37), 0.40 (0.37-0.42)	
Total calorie supply (min-max)	23 kcal/IBW/day (17-34)	
PN calorie supply sufficiency rate (min-max)	53% (0-82)	
Orally ingested calorie supply sufficiency rate (min-max)	47% (18-100)	
EN calorie supply sufficiency rate (min-max)	0% (0)	

Table 2. Number of participants by PS assessment results[†]

	Grade 0	Grade 1	Grade 2	Grade 3	Grade 4
Preoperative PS	51	0	0	0	0
Max PS grade during assessment period	0	0	18	31	2

Table 3. Comparisons between the %LBW ≥ 7.5% group and the %LBW < 7.5% group

	%LBW ≥ 7.5 Group (n = 13)	%LBW < 7.5 Group (n = 38)	P value*
Age (min-max)	51 (17-66)	52 (17-68)	0.34
Preoperative BMI (min-max)	23.3 (18.7-28.3)	21.9 (16.9-31.5)	0.27
Disease			
AML	5	9	
MDS	3	9	
CML	1	4	0.524
ALL	2	5	
ML	0	8	
Other	2	3	
Pretreatment regimen			
Bu/CY	3	9	
CY/TBI	2	5	0.976
Fu/Mel	5	13	
Fu/Bu	3	11	
Donor relation			
Related	10	26	0.561
Unrelated	3	12	
Assessment period (min-max)	61 days (29-98)	55 days (29-91)	0.37
%IBW (min-max)	106% (90-129)	100% (77-143)	0.28
%LBW (min-max)	-9.0% (-8.1-18.8)	-3.1% (-4.9-6.8)	<0.0001
Total calorie supply (min-max)	20 kcal/IBW/day (18-28)	24 kcal/IBW/day (17-34)	0.01
PN calorie supply (min-max)	13 kcal/IBW/day (0-20)	11 kcal/IBW/day (0-21)	0.59
Orally ingested calorie supply (min-max)	8 kcal/IBW/day (4-22)	12 kcal/IBW/day (4-28)	0.01
Total protein supply (min-max)	0.7 g/IBW/day (0.5-1.0)	0.8 g/IBW/day (0.5-1.4)	0.02
PN protein supply (min-max)	0.4 g/IBW/day (0-0.7)	0.4 g/IBW/day (0-0.7)	0.73
Orally ingested protein supply (min-max)	0.3 g/IBW/day (0.1-0.7)	0.4 g/IBW/day (0.2-1.1)	0.009
Start day of oral intake (min-max)	Day 21 (0-53)	Day 13 (0-53)	0.04
Engraftment day (min-max)	Day 18 (12-27)	Day 16 (9-27)	0.17
Acute GVHD incidence	79.9% (10/13)	42.1% (16/38)	0.03
Acute GVHD-skin max stage (min-max)	1.3 (0-3)	0.7 (0-3)	0.0428
Acute GVHD-liver max stage (min-max)	0.0 (0-1)	0.0 (0)	0.5893
Acute GVHD-intestine max stage (min-max)	0.7 (0-3)	0.1 (0-1)	0.0138
Acute GVHD-grade (min-max)	1.3 (0-3)	0.5 (0-1)	0.0095

Conclusion

I think Early and customized nutritional intervention may be optimal for all patients who undergo allogeneic stem cell transplantation to ameliorate body weight loss associated with nutrition-related adverse events, intestinal GVHD and nutritional status.