Hyperalimentation in Treatment of Anorexia Nervosa

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Abstract

Ten patients with anorexia nervosa were treated with intravenous hyperalimentation (IVH) and/or psychotherapy. The five patients were treated with both IVH and psychotherapy. Their body weight rose from $66 \pm 3\%$ (mean $\pm$ SE) to $78 \pm 6\%$ of their ideal weight during hospitalization, and then to $91 \pm 5\%$ during ambulatory observation for a period of 6 to 36 months. Another group of 5 patients were treated only with psychotherapy. Their body weight increased $69 \pm 3\%$ to $73 \pm 1\%$ of their ideal weight during hospitalization, and then to $78 \pm 1\%$ during the observation period at the out-patient department during a period of 6 to 48 months. The former group gained more weight than the latter group during hospitalization ($P < 0.025$) and during ambulatory observation ($P < 0.025$), respectively. These results suggest that IVH is one effective remedy for anorexia nervosa and that good results can be expected from IVH and psychotherapy used in combination.

Anorexia nervosa is a disorder occurring predominantly in females and characterized by a refusal to eat. According to the report by Crisp *et al.* (1976) severe anorexia nervosa is becoming more common, and the prevalence in Britain is one severe case in approximately every 200 girls. The patient reveals a distorted attitude toward eating and body image associated with severe weight loss. Though a variety of therapies, including behavior modification (Agras *et al.*, 1974; Halmi *et al.*, 1975), family therapy (Barcai, 1971), tube feeding and bed rest (Crisp, 1965) have been advocated, the treatment of anorexia nervosa is difficult and usually prolonged. In cases of severe malnutrition, a high mortality rate is reported (Bruch, 1971). For these patients, severe weight loss may require somatic treatment during the course of intensive psychotherapy. Nasogastric tube feeding and forced

bed rest are practiced, but neither has been well accepted by patients. A new technique has become available in the comprehensive treatment of severe malnutrition. This is called intravenous hyperalimentation (IVH). IVH is a method establishing nutritional balance in many cases of severe malnutrition that have internal complications and need rapid improvement in nutrition. Application of IVH to anorectic patients has recently been recommended (Finkelstein, 1972).

It has been well known that the triiodothyronine (T_3) serum concentration in anorectic patients is significantly lower than that of normal subjects (Miyai *et al.*, 1975; Moshang *et al.*, 1975). Nixon *et al.* (1980), however, reported that the creatinine height ratio (CHR) is a sensitive quantitative indication of protein-calorie undernutrition in cancer patients. In this article we describe the effect of IVH and psychotherapy on anorectic patients compared to that of psychotherapy without IVH,

and we discuss the T_3 and CHR values as an indicator of the nutritional condition in anorexia nervosa.

Materials and Methods

1) Subjects

Ten female patients, 14 to 27 years old, were studied. They demonstrated unequivocal signs of primary anorexia nervosa, according to the criteria of Feighner *et al.* (1972). Five patients were treated with IVH and psychotherapy (Group A) and the remaining 5 patients with psychotherapy only (Group B). The allocation of patients to the IVH therapy was mainly based on patients' acceptance. The length of hospitalization of group A was 8.8 ± 1.3 weeks and that of group B was 4.8 ± 1.2 weeks, and for the group A patients the duration of IVH was 4.2 ± 1.0 weeks. Table 1 indicates the clinical features and laboratory findings related to the patients. No significant difference was noted in age, duration of amenorrhea, weight loss and percentage of ideal weight between groups A and B. Laboratory tests revealed no abnormalities except a low level of BMR and T_3 , and the diagnosis of anorexia nervosa was established during hospitalization. The basal BMR, T_3 and weight of group A were lower than those of group B.

2) Hyperalimentation

In IVH a silicon rubber catheter (Toyo Hospital Supply Co.), was inserted into the infraclavicular subclavian vein and threaded into the superior vena cava. The nutrient solution was infused continuously. The basic solution was composed of 20% glucose, 4% amino acid, electrolytes, minerals and vitamins, but no lipid emulsion. The total volume was 40–50 cc/kg/day. Calorie intake was initially 30–40 Cal/kg/day then gradually increased to 60–70 Cal/kg/day. Oral intake of food was prohibited for the first 1–2 weeks and then allowed. The food intake was started at a level of 400–600 Cal/day.

Results

The patients in group A, whose weight ranged from 28.6 to 35.5 kg and gained 3.6 to 10.9 kg (5.7 ± 1.3 kg) during the IVH and psychotherapy treatment. They also gained 1.0 to 19.5 kg (6.5 ± 3.4 kg) during a follow-up term of 6 to 36 months after discharge. The percentage of their body weight to their ideal weight rose from a mean of $66 \pm 3\%$ up to

Table 1. Clinical features and laboratory findings of 10 patients with anorexia nervosa

	Pt.	Sex	Age	Duration of amenorrhea (months)	BMR (%)	T_3 (ng/dl)	Weight (kg)	Weight loss % of original weight	% of ideal weight		
									admission	discharge	follow-up
Group A	1	F	18	24	-3	38	28.6	36	72	99	108
	2	F	14	10	-16	103	35.5	25	68	78	80
	3	F	21	12	-25	25	30.0	45	54	62	94
	4	F	21	6	+2	65	31.6	32	68	76	91
	5	F	27	40	-10	91	30.0	25	70	77	82
mean $\pm$ SE			20 ± 2^a	18 ± 6^a	-12 ± 6^b	64 ± 15^b	31.1 ± 1.2^b	33 ± 4^a	66 ± 3^a	78 ± 6^c	91 ± 5^d
Group B	1	F	16	8	+1	74	35.9	42	70	71	80
	2	F	21	36	-15	88	37.0	25	70	70	75
	3	F	15	12	-17	93	36.0	25	77	77	77
	4	F	22	16	-29	45	31.5	37	64	73	82
	5	F	21	12	-8	74	35.5	26	63	72	77
mean $\pm$ SE			19 ± 1^a	19 ± 5^a	-14 ± 5^b	75 ± 8^b	35.0 ± 0.9^b	31 ± 4^a	69 ± 3^a	73 ± 1^c	78 ± 1^d

^aNon-significant, ^b $P < 0.05$, ^c $P < 0.025$, ^d $P < 0.001$, group A vs group B

$78 \pm 6\%$ during hospitalization and to a mean of $91 \pm 5\%$ during the ambulatory follow-up. On the other hand, the 5 patients in group B, whose weight ranged from 31.5 to 36.0 kg, gained 0 to 5.5 kg (2.1 ± 1.2 kg) during hospitalization and gained 0 to 4.5 kg (2.5 ± 0.8 kg) while they were observed in the out-

patient department (OPD) for a period of 6 to 48 months. The percentage of their body weight to their ideal weight rose from $69 \pm 3\%$ up to $73 \pm 1\%$ during hospitalization and to $78 \pm 1\%$ while they were observed in the OPD (Table 1). The patients in group A gained more weight than those in group B during

Fig. 1. Effects of intravenous hyperalimentation (IVH) on levels of T₃ and creatinine height ratio (CHR) in the patients. In group A treated with IVH and psychotherapy, the mean level of T₃ rose from 65 ± 15 (mean $\pm$ SE) to 123 ± 17 ng/dl ($P < 0.001$) and that of CHR increased from 3.0 ± 0.4 to 4.3 ± 0.3 mg/cm ($P < 0.001$). In group B treated with psychotherapy only, the mean level of T₃ rose from 75 ± 8 to 95 ± 5 ng/dl (NS) and that of CHR changed from 4.2 ± 0.4 to 4.7 ± 3.6 mg/cm (NS) during hospitalization. The number beside the closed circle indicates the patient's number in table 1.

hospitalization ($P < 0.025$) and during ambulatory observation ($P < 0.025$). We investigated whether the levels of T_3 and CHR were improved by IVH. In group A, the mean T_3 level rose significantly from 64 ± 15 to 123 ± 17 ng/dl ($P < 0.001$) after 4.2 ± 1.0 weeks of IVH therapy. The T_3 level of a normal young female is 100 to 200 ng/dl. The mean CHR level rose significantly from 3.0 ± 0.4 to 4.3 ± 0.3 mg/cm ($P < 0.001$). The normal range of CHR is 4.5 to 7.0 mg/cm. In group B, the mean level of T_3 increased from 75 ± 8 to 94 ± 5 ng/dl during hospitalization and the CHR level changed from 4.2 ± 0.4 to 4.7 ± 0.6 mg/cm, as shown in Fig. 1.

Discussion

The treatment of anorexia nervosa is difficult, and patients often relapse. According to Lucas *et al.* (1976), severe anorexia nervosa has a high mortality rate. Sometimes it is not sufficient to treat an intractable anorectic patient with psychotherapy only. In cases of severe malnutrition, it is necessary to improve metabolism immediately before psychotherapy is started. In our study, two patients in group A were too cachectic to respond to any mental approach, and their weight gradually decreased in spite of hospitalization until IVH therapy was started. It is important to decide on the indications of IVH therapy. We suggest the following indications for IVH, 1) life threatening weight loss, 2) no tendency to weight increase in spite of hospitalization and psychotherapy. Maloney and Farrell (1980) reported that good results can be expected by treating severe anorexia nervosa with hyperalimentation and psychotherapy. Furthermore, they also reported that the good effect of IVH continued during the follow-up term as the patients gained more and more weight. Our patients in group A also continued to gain more weight than the patients in group B after discharge. These results suggest that the effect of IVH on anorexia nervosa is not

transient and it is important to improve metabolism rapidly during the hospitalization of these patients. Radical problems related to the illness cannot always be solved with IVH and psychotherapy including behavior modification, but family therapy and other psychological treatment should be continued in an interdisciplinary approach.

Low levels of T_3 and CHR were markedly improved with IVH. In anorexia nervosa, it is uncommon to find hypoproteinemia or hypoalbuminemia in spite of severe malnutrition. In group A patients T_3 and CHR levels rose in parallel with the increase in weight during IVH, and the levels of No. 4 and No. 5 patients in group B also rose during the treatment. On the other hand, in No. 1, 2 and 3 patients in group B who did not gain weight significantly, no significant change in the levels was seen. Our data indicate that T_3 and CHR as well as weight are good measures of nutrition in patients with anorexia nervosa.

These results suggest that IVH is not a panacea for anorexia nervosa, but IVH is worth using on intractably severe anorectic patients who need rapid improvement in metabolism for a time during hospitalization.

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