Analysis of Bone Mineral Density in Turner Syndrome —Longitudinal Data—

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Abstract. The bone mineral density of the 2nd metacarpal of the left hand was measured by the Digital Image Processing Method (DIP) in five Japanese children with Turner syndrome. We made growth curves of bone mineral density, based on bone age, which were measured by the TW2 RUS method. In all cases bone mineral density showed increased values for 2-5 years, but SD scores were not much changed at any measuring-point after GH-treatment. These data indicate that GH treatment may have no effect on bone mineral density.

Key words: Turner syndrome, hGH therapy, bone mineral density, DIP method

Introduction

We report five cases of Turner syndrome which were treated with growth hormone. The effects of growth hormone on bone mineral density were studied for 2-5 years. We obtained longitudinal data of bone mineral density for all cases.

Subjects and Methods

Measurement of bone mineral density by the DIP method was performed on five cases of Turner syndrome. The bone chosen for this method was the 2nd metacarpal of the left

hand. Other parameters such as bone age, chronological age and body height were also measured, and growth curves of bone mineral density were obtained. All cases were of short stature and the average height SD score was -2.9 . [Table 1]

Table 1. Patient Data

Case1			Case2			Case3		
CA	RUS	BMD-SD	CA	RUS	BMD-SD	CA	RUS	BMD-SD
3.45		2.48	11.97	9.7	-1.78	6.02	7.7	0.99
4.28		1.20	12.37	10.8	-1.15	6.61	8.6	0.41
4.55		-0.76	12.61	10.9	-3.54	6.81	8.8	-0.71
4.99		0.90	12.97	10.9	-2.58	7.36	8.8	-0.06
5.45	3.3	-0.85	13.43	10.9	-2.28	7.64	9.4	0.20
5.68	4.7	-0.44	13.94	11.3	-2.41	8.2	10	0.76
			14.36	11.8	-1.94	8.62	10.1	-0.98

Case4			Case5		
CA	RUS	BMD-SD	CA	RUS	BMD-SD
5.4		1.25	4.02	3.7	0.45
5.71		2.83	4.49	5.2	1.74
5.92	3.3	1.19	5.14	5.4	0.11
6.41	5.2	3.44	6.49	7	0.28
6.76	5.4	1.07	6.76	7.1	-0.71
7.42	6.3	2.84	7.11	7.6	-1.64
7.95	7.2	1.16	7.36	8	0.60
			8.01	9.1	0.60

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Results

Fig. 1 shows growth curves of bone mineral density based on chronological age. Basal mineral density was low in the pubertal period, but less so in the prepubertal period. In all cases bone mineral density values increased, but SD scores were not much changed at any measuring-point. Fig. 2 shows growth curves of bone mineral density based on bone age, measured by the TW2 RUS method. Bone age is based on the Japanese standard. It shows almost the same pattern as Fig. 1 but in the pubertal period it is not low. In the one case in which bone mineral density was low, bone age was retarded. Because of this retardation her bone mineral density was low in the pubertal period, but in Fig. 2 we cannot see the low density.

Discussion

Bone mineral density increases significantly with age in childhood, with a steeper increase at the time of puberty. [1] According to Saggese *et al.*, GH-deficient children show significant reduction of bone mineral density for their chronologic, statural, and bone ages, but bone mineral density significantly improves after 12 months of GH treatment. [2, 3,4] Using two figures, we show longitudinal data of bone mineral density in Japanese cases of Turner syndrome. When bone ages are substituted for chronological ages, almost all bone mineral densities are distributed within the normal range. After the growth hormone therapy, SD scores did not change for a few years. These results suggest that we have to estimate the bone age when measuring

$\Sigma GS/D$

Fig. 1. BMD SD score changes after GH treatment (CA)

BMD in Turner Syndrome

bone mineral density and that growth hormone has no effect on bone mineral density.

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Fig. 2. BMD SD score changes after GH treatment (RUS)