

Effect of gonadotropin-releasing hormone agonist treatment in boys with central precocious puberty and early puberty

Eun Young Kim¹, Kyung Hee Yi², Jae Hee Lee¹

Department of Pediatrics, Chosun University, College of Medicine, Gwang-Ju, South Korea¹, and Department of Pediatrics, Wonkwang University Sanbon Medical Center, Gunpo, South Korea²

OBJECTIVES

Background: In boys, precocious puberty is appearance of secondary sex characteristics before the age of 9 years. Central precocious puberty (CPP) is due to organic disorders of the central nervous system or can be idiopathic. The former is more frequent in boy and the latter in girl. CPP is less common in boys than girls; very little data is reported on efficacy of gonadotropin-releasing hormone analog (GnRHa) treatment in boys with CPP.

Objective: The aim of the study was to evaluate growth changes in boys with CPP and early puberty (EP) treated with GnRHa therapy for 1 year.

METHODS

This study included 60 boys with confirmed diagnosis of CPP (n=39) and EP (n=21). Anthropometric and endocrine parameters were obtained at baseline, at 6 months, and at 1 year after GnRHa treatment in boys with CPP and EP. Pubertal progression ceased in all patients after GnRHa treatment.

Evaluation: Birth history (gestational age, birth weight), paternal and maternal height, growth velocity, chronological age at diagnosis, height (z score), body weight (z score), body mass index (z score), pubertal stage, basal and stimulated gonadotropin levels, testosterone, brain MRI. Predicted adult height (PAH) was calculated according to the method of Bayley and Pinneau twice for each patient, as follows: the tables for accelerated girls, in which BA is advanced for CA by 1 yr or more (PAH-BP) and the tables for average girls, in which BA is within 1 yr of CA (PAH-BPav)

RESULTS

Table 1. Clinical and biochemical characteristics of boys with CPP At the start, 6 months and 1 year of treatment

	Before treatment	At 6 months of treatment	At 1 year of treatment
Age (yr)	9.8±0.58	10.3±0.62*	10.8±0.59*†
Height (cm)	141.1±6.57	144.4±6.67*	147.2±6.72*†
Height SDS	0.8373±0.92	0.8845±0.92	0.8159±0.88†
BMI (kg/m ²)	19.39±2.37	19.61±2.23	19.98±3.41
BMI SDS for CA	0.4787±0.72	0.415±0.69	0.4942±0.70
BA (yr)	11.4±0.98	11.8±1.03	12.2±1.04*†
BA/CA ratio	1.167±0.08	1.153±0.09	1.129±0.08*†
Growth velocity (cm)		6.33±1.60	5.48±1.40†
PAH-BPav (cm)	173.1±7.20	174.2±7.04*	174.8±7.00*
PAH-BPav SDS	-0.04988±1.27	0.1445±1.24*	0.2505±1.23*
PAH-BP (cm)	180.4±7.98	181.1±7.93	181.2±7.76
PAH-BP SDS	1.2406±1.38	1.3566±1.36	1.3717±1.34
Peak LH (mLU/mL)	14.70±5.33	0.32±0.22*	0.30±0.20
Peak FSH (mLU/mL)	6.46±3.28	0.38±0.18*	0.54±0.30
Testosterone (ng/mL)	1.83±3.33	0.13±0.10*	0.12±0.10*

Table 2. Comparison of clinical and biochemical findings in boys with CPP or early puberty at diagnosis

	CPP	Early puberty
Age (yr)	9.53±0.53	10.32±0.23*
Gestational age (week)	39.12±1.18	39.26±0.68
Birth weight (kg)	3.13±0.44	3.31±0.31
Target height (cm)	171.1±3.88	171.1±3.24
Target height SDS	-0.3919±0.69	-0.3926±0.58
Height (cm)	140.0±6.37	143.2±6.58*
Height SDS	0.9018±0.86	0.7175±1.02
BMI (kg/m ²)	19.42±2.40	19.33±2.36
BMI SDS	0.5489±0.72	0.3484±0.73
BA	11.2±1.04	11.8±0.69*
BA/CA ratio	1.177±0.09	1.149±0.05
PAH-BPav	173.1±7.47	173.2±6.85
PAH-BPav SDS	-0.0577±1.32	-0.0351±1.21
PAH-BP	180.7±8.38	179.9±7.35
PAH-BP SDS	1.2858±1.45	1.1566±1.28
Peak LH (mLU/mL)	14.85±6.03	14.43±3.85
Peak FSH (mLU/mL)	6.87±3.35	5.70±3.06
LH/FSH ratio	2.486±1.23	2.911±1.05
Testosterone (ng/mL)	1.262±1.25	2.890±5.29

Table 4. Comparison of clinical and biochemical findings between idiopathic CPP cases and organic CPP cases in boys

	Idiopathic	Organic
Age (yr)	9.85±0.52	9.38±0.98
Gestational age (week)	39.1±0.07	39.3±0.57
Birth weight (kg)	3.18±0.42	3.28±0.22
Target height (cm)	171.3±3.63	169.5±3.52
Target height SDS	-0.3594±0.64	-0.6871±0.63
Height (cm)	141.8±6.25	135.1±6.85*
Height SDS	0.9040±0.88	0.2371±1.09
BMI (kg/m ²)	19.32±2.36	20.01±2.53
BMI SDS	0.4363±0.72	0.8605±0.74
BA	11.5±0.92	10.7±1.24
BA/CA ratio	1.170±0.08	1.143±0.06
PAH-BPav	173.3±7.16	170.8±7.88
PAH-BPav SDS	-0.0042±1.26	-0.4605±1.41
PAH-BP	180.7±8.02	178.6±8.11
PAH-BP SDS	1.2770±1.39	0.9125±1.42
Peak LH (mLU/mL)	14.66±5.31	15.06±6.02
Peak FSH (mLU/mL)	6.51±3.17	6.01±4.46
LH/FSH ratio	2.589±1.16	3.043±1.38
Testosterone (ng/mL)	1.94±3.49	0.83±0.87

Table 5. Clinical and biochemical characteristics in boys with idiopathic or organic CPP cases at the 6 months and 1 year of treatment

	At 6 months of treatment		At 1 year of treatment	
	Idiopathic	Organic	Idiopathic	Organic
Age (yr)	10.37±0.54	9.77±1.06	10.9±0.52	10.4±0.99*
Height (cm)	145.1±6.37	138.5±6.99*	147.9±6.35	140.9±7.24*
Height SDS	0.9443±0.89	0.3463±1.12	0.8753±0.84	0.2810±1.14
BMI	19.49±2.20	20.73±2.39	19.85±3.48	21.21±2.54
BMI SDS	1.3289±7.18	0.8611±0.77	0.4535±0.68	0.8610±0.84
BA (yr)	11.9±1.00	11.1±1.16	12.3±1.01	11.9±1.39
BA/CA ratio	1.154±0.09	1.144±0.08	1.128±0.08	1.142±0.06
PAH-BPav (cm)	174.4±6.93	172.2±8.34	175.4±6.82	169.5±6.86*
PAH-BPav SDS	0.1841±1.22	-0.2118±1.49	0.3550±1.20	-0.6900±1.23*
PAH-BP	181.3±7.87	179.2±9.00	181.8±7.60	175.6±7.61
PAH-BP SDS	1.3940±1.34	1.0193±1.57	1.4797±1.31	0.3998±1.33
Growth velocity (cm)	6.28±1.63	6.78±1.39	5.53±1.35	5.01±1.81
LH (mLU/mL)	0.319±0.22	0.356±0.27	0.313±0.20	0.203±0.14
FSH (mLU/mL)	0.387±0.19	0.405±0.14	0.541±0.29	0.595±0.48
Testosterone (ng/mL)	0.137±0.10	0.120±0.04	0.126±0.10	0.145±0.08

Table 3. clinical and biochemical characteristics in boys with CPP or early puberty at the 6 months and 1 year of treatment

	At 6 months of treatment		At 1 year of treatment	
	CPP	Early puberty	CPP	Early puberty
Age (yr)	10.02±0.58	10.84±0.24*	10.57±0.53	11.37±0.25*
Height (cm)	143.2±6.34	146.6±6.84*	146.0±6.36	149.3±7.02
Height SDS	0.9372±0.86	0.7865±1.04	0.9081±0.81	0.6447±1.00
BMI	19.68±2.25	19.48±2.25	19.8±3.82	20.3±2.53
BMI SDS	0.4917±0.68	0.2746±0.71*	0.5525±0.68	0.3859±0.75
BA (yr)	11.6±1.08	12.3±0.71*	12.01±1.08	12.7±0.80*
BA/CA ratio	1.16±0.1	1.142±0.06	1.135±0.08	1.119±0.07
PAH-BPav (cm)	174.5±7.45	173.5±6.31	175.5±7.12	173.3±6.69
PAH-BPav SDS	0.2069±1.31	0.0286±1.12	0.3872±1.25	-0.0033±1.19
PAH-BP	181.8±8.52	179.6±6.67	182.3±7.98	179.2±7.08
PAH-BP SDS	1.4923±1.45	1.1045±1.16	1.5586±1.37	1.0246±1.23
Growth velocity (cm)	6.15±1.41	6.67±1.90	5.6±1.22	5.2±1.68
LH (mLU/mL)	0.309±0.23	0.348±0.21	0.304±0.21	0.300±0.17
FSH (mLU/mL)	0.410±0.20	0.351±0.14	0.555±0.25	0.531±0.39
Testosterone (ng/mL)	0.141±0.10	0.125±0.09	0.135±0.10	0.114±0.08

1. During the treatment a decline in Ht SDS and growth velocity, LH, FSH and testosterone levels were observed (p<0.01); and a deceleration in the maturation of bones after 1year GnRHa treatment was observed (p=0.000).

2. Predicted adult height (PAH) SDS was increased during treatment with GnRHa (p<0.01).

3. There was no difference between CPP and EP groups except for age and bone age after 1 year GnRHa treatment.

4. There was significant difference in PAH SDS between organic CPP and idiopathic CPP (p<0.05).

CONCLUSIONS

The present data indicate that GnRHa therapy significantly improves growth prognosis in boys with CPP and EP. Boys with organic forms might have poorer height prognosis.

References

1. Treatment of central precocious puberty by GnRH analogues: long-term outcome in men. Asian J Androl 2008;10: 525-534
2. Changing etiological trends in male precocious puberty: evaluation of 100 cases with central precocious puberty over the last decade. Horm Res Paediatr 2015; 83: 340-344
3. Effect of antiandrogen, aromatase inhibitor, and gonadotropin-releasing hormone analog on adult height in familial male precocious puberty. J Pediatr 2017;190: 229-35

P3-P334, ESPE 2018