Effect of gonadotropin-releasing hormone agonist treatment on final adult height in boys with idiopathic central precocious puberty

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OBJECTIVES

Background: Gonadotropin releasing hormone agonists (GnRHa) are the drugs of choice for treatment of central precocious puberty (CPP). These drugs are able to restoring growth potential in GnRH agonists treated CPP patients. Because CPP is less common in boys than girls, very little data is reported on long-term effects of gonadotropin-releasing hormone analog (GnRHa) treatment in boys with CPP.

Objective: Therefore, this study analyzed the effects of GnRHa treatment on the final adult height and factors that could affect the final height in boys diagnosed with idiopathic CPP.

METHODS

This study included 18 boys with confirmed diagnosis of idiopathic CPP. Anthropometric and endocrine parameters were obtained at baseline, at 6 months, at 1 year after GnRHa treatment and at the time of reaching the final adult height in boys with CPP.

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 boys, in which BA is advanced for CA by 1 yr or more (PAH-BP) and the tables for average boys, 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, and adult height.

	at diagnosis	6mo after Tx	1yr after Tx	Last visit (AH)
Age (yr)	9.9±0.6	10.4±0.6*	10.9±0.6†	15.5±1.5‡
Height (cm)	141.8±7.2	145.1±7.5*	147.9±7.2†	171.7±4.8‡
Height SDS	0.88±0.9	0.91±0.9	0.87±0.9	0.39±1.0‡
Body weight (kg)	40.0±7.2	41.7±8.3*	45.2±8.5†	64.3±8.6‡
BW SDS	0.80±0.6	0.70±0.6	0.75±0.6	0.36±0.8‡
BMI	19.8±2.5	19.6±2.5	20.4±2.7†	21.9±3.0‡
BMI SDS	0.56±0.7	0.37±0.7*	0.50±0.7	0.22±0.9‡
BA	11.6±1.0	12.1±1.1*	12.4±1.2	-
BA/CA ratio	1.19±0.1	1.16±0.1	1.16±0.1	-
PAH-Bpav (cm)	172.7±5.7	173.8±4.9	174.0±5.1	-
PAH-BP (cm)	179.6±6.2	180.3±5.3	180.2±5.6	-
Peak LH (mLU/mL)	16.6±4.3	0.3±0.2*	0.3±0.2	-
Peak FSH (mLU/mL)	6.1±2.2	0.4±0.2*	0.5±0.3	-
Testosterone (ng/mL)	3.24±5.6	0.11±0.1*	0.09±0.1	-
Growth velocity (cm)	-	6.6±1.7	5.5±1.2	-
Target HT	171.0±4.0			
Duration of Tx (mo)	23.6±9.1			

Table 2. Associated with AH (centimeters) between predicted adult height according to GnRHa treatment in boys with CPP.

AH (cm)	171.7±4.8	*P*- value
PAH at DX (cm)	172.7±5.7	0.59
PAH at 6m (cm)	173.8±4.9	0.199
PAH at 1yr (cm)	174.0±5.1	0.174
PAHA at DX (cm)	179.6±6.2	<0.001
PAHA at 6m (cm)	180.3±5.3	<0.001
PAHA at 1yr (cm)	180.2±5.6	<0.001
Target HT (cm)	171.0±4.0	0.635

Table 3. Factors associated with AH (centimeters) in boys treated with GnRHa for CPP using simple linear regression analysis

	r2	P value
At diagnosis		
Age	0	0.96
Target height	0.431	0.003
PAH	0.27	0.027
PAHA	0.22	0.049
HT	0.262	0.03
HT SDS	0.398	0.005
BW	0.002	0.849
BW SDS	0.001	0.902
BMI	0.134	0.136
BMI SDS	0.15	0.113
BA	0.035	0.46
BA/CA	0.026	0.525
LH	0.026	0.52
FSH	0.057	0.341
LH/FSH	0.132	0.139
Testosterone	0.156	0.104
At 6mo after treatment		
Age	0	0.942
HT	0.245	0.037
HT SDS	0.376	0.007
BW	0.013	0.647
BW SDS	0.021	0.562

	r2	P value
At 6mo after treatment		
BMI	0.056	0.342
BMI SDS	0.07	0.287
BA	0.026	0.52
BA/CA	0.038	0.439
PAH	0.591	<0.001
PAHA	0.459	0.002
GV	0.024	0.537
LH	0.084	0.242
FSH	0	0.963
Testosterone	0.026	0.524
at 1year after treatment		
Age	0.002	0.854
Height	0.24	0.039
Height SDS	0.4	0.005
BW	0.001	0.894
BW SDS	0.003	0.818
BMI	0.165	0.095
BMI SDS	0.199	0.063
BA	0.002	0.847
BA/CA	0.003	0.836
PAH	0.407	0.004

	r2	P value
At 1year after treatment		
PAHA	0.337	0.011
Growth velocity	0.031	0.486
LH	0	0.997
FSH	0.091	0.223
Testosterone	0.005	0.774
At adult height		
age	0.015	0.623
BW	0.025	0.531
BW SDS	0.003	0.842
BMI	0.075	0.272
BMI SDS	0.103	0.194
Duration of treatment	0.003	0.823

summary

1. The duration of GnRHa treatment was 23.6±9.1 months.
2. AH, reached after GnRHa treatment was 171.7±4.8 cm, it was similar to the pretreatment predicted AH (PAHav) for average tables of Bayley and Pinneau (BP).
3. Also it was similar to the target height (TH, 171.0±4.0 cm). The pretreatment PAH for accelerated tables of BP (179.6±6.2 cm) was overestimated than AH (P〈0.001).
4. Hormone levels reduced during treatment, increased to normal after GnRHa treatment.
5. BMI-SDS for chronological age was decreased during and after GnRHa treatment.
6. Regression analysis between AH and several parameters showed a positive correlation with TH, and PAHav, PAH, HT, and HTSDS at diagnosis, 6 months and 1 year after treatment.
7. In multiple regression analysis of the variables that affect the AH, PAHav at 6months after GnRHa treatment had positive correlation with AH (P〈0.001).

CONCLUSIONS

The present data indicate that GnRHa treatment can improve final adult height into the range of target height without significant adverse effects in boys with CPP.

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